

UNIVERSAL MODEL AIRPLANE NEWS

DECEMBER

20¢
Canada
25c

THE ONLY MAGAZINE DEVOTED EXCLUSIVELY TO EXPERIMENTAL AVIATION"



U. S. ARMY DOUGLAS 043-A

PEERLESS KITS for Successful Models!

WACO CABIN BIPLANE

Span 24½". ¾" scale. Length 18¾".



**QUALITY
ALWAYS**



Peerless fans demanded that we bring out a Kit for the Cabin Waco—and here it is. This popular Cabin Waco—the YKC—is powered by a Jacobs engine of 225 H.P. Top Speed is 150 M.P.H. This model, faithful in every way to the detail of the large Waco, is designed after the particular ship, in name, numbers, color scheme, motor, etc., that the Waco Aircraft Co. uses in its advertising.

Because of its fine design and good balance this model is a good steady flyer.

Kit is very complete with PRINTED WOOD. Colored dopes are cream with Green for trimming and Silver and Black for touch up. **\$3.00**

Price Complete.....
(10% additional west of Denver)



LOCKHEED VEGA

Span 20½" Length 13¾"



This is the photo of our ½" scale model that fooled the Lockheed engineers. Colored Orange with Black striping. A beauty. Kit has PRINTED WOOD and all other materials.

\$1.45

(10% additional west of Denver.)

CURTISS NAVY HAWK

Span 23½"

Length 16¾"



You can build your perfect model from the kit of this ¾" scale flying model. Full details with dummy bombs, radio mast, etc. Painted in five colors, it's a beauty. PRINTED WOOD. Complete plans, etc. are included in the kit. Price only **\$2.75**

(10% additional west of Denver.)

SOPWITH CAMEL

Span 20"

Length 14¾"



A ¾" scale flying model of this well known wartime aircraft. Authentic, detailed and accurate. An excellent flyer. Colored Yellow for wings, tail and fuselage, with Red for nose and struts. Kit is complete with PRINTED WOOD. Price.... **\$1.50**

(10% additional west of Denver.)

BIRD BIPLANE



Span 25½" ¾" scale Length 17½"

This flying model has proved to be one of our most popular kits. It has a wealth of details that are fully explained on the complete plans that are furnished with each. Colored bright red and silver with PEERLESS colored dopes giving a smooth finish just like the real ship. The flying qualities of this ship are excellent due to its expert design. Kit has PRINTED WOOD, all cement, dopes, insignia, etc. **\$2.25**

Price complete.....

(10% additional west of Denver.)

DEALERS!

PEERLESS KITS AND SUPPLIES are becoming more popular every day. They are real trade builders. Write for prices and discounts.

PEERLESS FLYING MODELS

Here is the complete list of Peerless Flying Model Kits. Each Kit is complete with plenty of materials to build the model including PRINTED WOOD, dopes, cement, full size plans, directions, etc.

CHALLENGER An R.O.G. model—excellent for the beginner. Span 14¾" Length 12¾". Each... 25c

CLIPPER FUSELAGE TYPE R.O.G. model. Great indoor stunt plane and speed racer. Span 16" Length 12½". Each... 50c

LAIRD 400 Doolittle's famous racer of 1931. ½" scale. Span 10½" Length 9½". Each... 75c

BRITISH SESA A wonderful flying model. ½" scale. Span 13½" Length 10". Each... 75c

GEE BEE The speed sensation of 1932. ½" scale. Span 12½" Length 9-3/16". Each... 85c

CURTISS HAWK P6E A big Kit for the money. ½" scale. Span 15¼" Length 11¼". Each... \$1.00

BEN HOWARD'S "HKE" The white speed demon. ¾" scale. Span 15½" Length 12¾". Each... \$1.00

VICKERS SUPERMARINE S0B. Beautiful R. O. W. Racer ½" scale. Span 13½" Length 14". Each... \$1.35

LOCKHEED VEGA A snappy monoplane. ½" scale. Span 20½" Length 13¾". Each... \$1.45

SOPWITH CAMEL Best remembered war plane. ¾" scale. Span 20" Length 14¾". Each... \$1.50

FOKKER TRIPLANE. Famous German warplane. ¾" scale. Span 18½" Length 14". Each... \$1.50

BOEING P12F U.S. Army Fighting Plane. ¾" scale. Span 22½" Length 15". Each... \$1.75

BIRD BIPLANE Popular detailed model. ¾" scale. Span 25½" Length 17½". Each... \$2.25

CURTISS SWIFT Latest U. S. Pursuit Plane. ¾" scale. Span 27" Length 20¾". Each... \$2.50

CURTISS NAVY HAWK. Pursuit and Dive Bomber. ¾" scale. Span 23½" Length 16¾". Each... \$2.50

WACO CABIN BIPLANE. Our Newest Kit. ¾" scale. Span 24½" Length 18¾". Each... \$3.00

Add 10% to above prices for shipment west of Denver.

U. S. ARMY-CURTISS SWIFT

Span 27"

Length 20¾"



Streamlined for speed this model has flown over 600 feet. Colored Yellow for the wing. Olive Drab for the fuselage, Silver for prop. and cockpit inside. Black for touch up. ¾" scale. KIT is complete with PRINTED WOOD, dopes, etc.

\$2.50

(10% additional west of Denver.)

DOOLITTLE'S GEE BEE

Span 12½"

Length 9 3/16"



Here is a ½" scale model of the popular speed sensation of 1932. And it is a good flyer, too. Plenty of detail. All numbers, dice, etc. printed in correct colors. Colored red and white. Kit contains PRINTED WOOD and all other materials.

85c

Price only (10% additional west of Denver.)

CURTISS HAWK P-6-E

Span 15¼"

Length 11¼"



A detailed ½" scale flying model of this well designed plane. Colored Army yellow and olive drab with Arctic Owl in black and white. A big kit for the money. Complete kit with all dopes, cement, PRINTED WOOD, etc. Price

\$1.00

(10% additional west of Denver.)

Send 3c Stamp for Your Copy of Our New Catalog

PEERLESS MODEL AIRPLANE COMPANY

15531 MADISON AVENUE

LAKEWOOD, OHIO, U. S. A.

Make this a PEERLESS Christmas!



New and Improved $\frac{1}{4}$ Inch Scale Kits (Solid Wood)



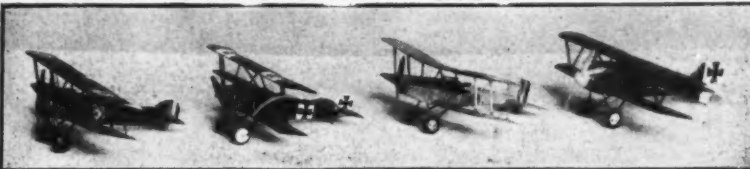
SOPWITH PUP WESTLAND WAGTAIL PFALZ D12 ANSALDO S.V.A.



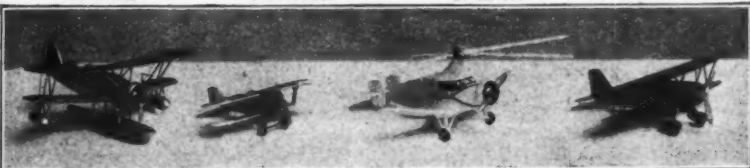
FOKKER D7 FOKKER D8 NIEUPORT 28 NIEUPORT 17



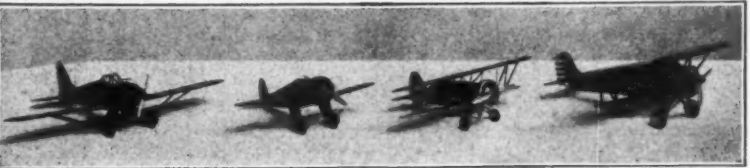
PFALZ DIII BRISTOL FIGHTER SPAD 13 HALBERSTADT



CAMEL FOKKER S. E. 5A ALBATROSS



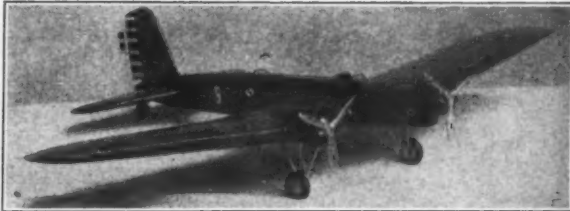
B/J SEAPLANE NAVY RACER AUTOGIRO CURTISS HAWK P.6 E



CURTISS SWIFT BOEING P-26 BOEING F4B-3 B/J PURSUIT

BOEING TRANSPORT

BOEING BOMBER Y1B-9A



Now you can build the Boeing Transport or the Boeing Bomber pictured here and have an exact $\frac{1}{4}$ inch scale replica model for **\$1.65**

The kit sets contain all the wood parts cut to outline shape, two scale die cast Wasp Motors, two scale die cast three bladed propellers, all ready to mount, and cast wheels. A full size $18\frac{1}{2}$ inch wing span plan, glue, paint, etc., comprise the kits. When you consider that the fuselage, wings, rudder, and elevator are cut to shape and NOT blocks of wood, motors and propellers are ready to mount, and the size of the plane, $18\frac{1}{2}$ inch wing span, you will realize we have produced a construction set that is in a class by itself. We Guarantee these kits to be as stated, and know you will be satisfied.

These kits can be had in either balsa or pine at \$1.65 EACH

HAWK MODEL AEROPLANES

4946-48 Irving Park Blvd.

Dept. W6

CHICAGO, ILL.

NOTE:—Please add 10% to your order for postage.

BUILD 4 Exact $\frac{1}{4}$ -Inch to the Foot SCALE MODELS for \$1.50

The planes pictured here can be had in kits at 50 Cents each, or Four for \$1.50.

Each kit contains all wood parts CUT TO OUTLINE SHAPE; die cast machine guns, where needed; die cast propellers and wheels. Metal seats all made, paints, glue, insignia, real scale plans etc.

Die cast radial motors are included in modern plane kits where needed.

In addition to the planes pictured here you can get kits for the Hawk P. 5, Curtiss Racer, Hawker Fury, Supermarine, D.H.4, D.H.5, Vought 65, and Monocoupe at the same price.

REMEMBER

We are the originators of the $\frac{1}{4}$ -inch - to - the - foot scale model airplanes with the following features:

All parts are cut out
Die cast propellers
Die cast wheels
Die cast machine guns
Finished metal seats
Full-size $\frac{1}{4}$ Scale Drawing
in These De Luxe Kits

Note: This price does not apply to the Boeing Transport or Bomber

Universal Model AIRPLANE News

VOL. XI

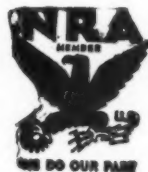
NO. 5

Edited by Charles Hampson Grant

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In Our Next Issue

Due to unavoidable circumstances it was necessary to postpone the publication of *Aerobats of the Sky*, by Lieut. H. B. Müller.

Fletcher Pratt gives you interesting and significant highlights of the London to Melbourne Air Race in our feature article.

You are given complete data from which you can build an excellent flying scale model of a famous German World War plane, in *Build and Fly the Fokker D-8*, by Harry Shaffer.

Robert Morrison gives the latest plane innovations that appeared at the Cleveland Air Races in *Frontiers of Aviation*.

Information concerning The Eastern States Annual Indoor Contest, to be held in New York between Christmas and New Year's Day.

Fundamentals of Model Airplane Building, by Edwin T. Hamilton, gives you plans and data to build a simple albatross fuselage model with unusual flying qualities.

Illustrated Aviation Dictionary will be continued.

Other interesting and helpful articles as *The Aerodynamic Design of the Model Plane*, *Air Ways*, *Aviation Advisory Board*, *The N.A.A. Junior Membership News* and *Illustrated Aviation Dictionary* makes the January issue a complete course in experimental aviation.

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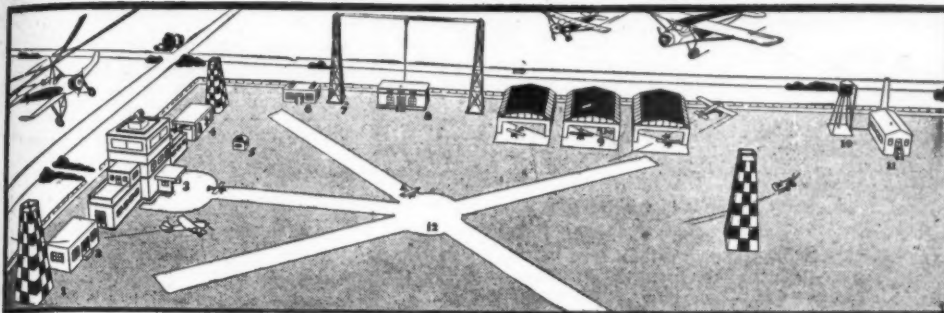
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MAKE A HAPPY CHRISTMAS LANDING— RIGHT ON THIS NATIONAL MODEL AIRPORT



Scaled for Detail—Detailed for Scale

This carefully detailed model airport, (an exclusive National development), is taking the attention of model builders everywhere. It is providing the individual, schools and clubs with a most interesting and educational project.

NATIONAL MODEL AIRPORT is so complete that you will feel yourself right in the atmosphere of the great airports of the country, as you build and arrange this colorful miniature layout.

The complete kit features ten buildings, three pylons and radio towers. A large ground plan 44" x 62" with its soft green background, runways, aprons and location of buildings marked out. And, of course, a fleet of

NATIONAL MODELS ARE ACCURATELY DESIGNED FOR DETAIL AND FLIGHT. Simple directions, clear accurate drawings, authentic details, formed wire parts and many other exclusive features make National models easy to build. You can't go wrong—and they fly!

ASK YOUR DEALER TO SHOW YOU THESE NEW NATIONAL KITS. If he can't supply you, send your orders direct. Do not accept substitutes and be disappointed.

Complete to the last detail as shown or each kit separate as listed below:

1. Three Pylons	.....\$3.35
2. Post Office	.....25
3. Administration Bldg.	.....1.00
4. Gas Station	.....1
5. Refreshment Stand	.....30
6. Machine Shop	.....30
7. Radio Towers	.....50
8. Radio Station	.....75
9. Three Hangars	.....30
10. Water Tower	.....50
11. Power House	.....30
12. Field Mat	.....30
13. Six Commercial Model Kits	.....35
14. Six Sport Model Kits	.....35
Airport construction kit, complete, as shown and listed above (plus P. P. 35c)	\$5.00



42 1/2" DOUGLAS TRANSPORT

Look at this ultra-modern model of "the world's greatest airliner." Glance over the rakish lines of National's 1/2" true-scale flying model of this great transport plane that Capt. Eddie Rickenbacker flew from California to New York in 13 hrs., 4 min., 20 sec., with its full load of passengers and express.

You can't go wrong with National's big three view fully detailed plan and instructions, whether you build flying or exhibition scale model. It's the most realistic model you have ever seen. The kit includes special cambered halves for fuselage, roof covering, turned motor cowlings, turned nose block and wheels, printed wood parts, 3 blade laminated groups (for flying model), window material, formed wire parts, jap paper for covering, cement, gray silver dope and full insignia, display packed in a sturdy box.

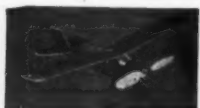
This model masterpiece weighs 6 oz. with headlights, venturi tubes, windows, doors that open, the new split trailing edge flaps (air brakes) wing and tail lights. Think of a wing span of 42 1/2"! A length of 29 1/2"! Then think of the value represented—at our low price for the complete kit. Plus 50c mailing charge. **\$5.00**



FAIRCHILD 23, Model C7-F

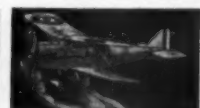
A New National 1/2" Scale Model

Span 16 1/2", Lgt. 12 1/2" Wgt. 3/4 oz. Colors: green fuselage, orange wing and tail silver trim. Features: Hollow Motor Tube, adjustable elevators and rudder, fully-detailed 3-view plan and instructions. Kit contains all material, with many parts semi-finished. Complete Kit. (Plus P. P. 15c) **\$1.00**



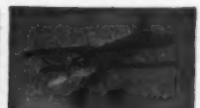
TAYLOR CUB

A 12" flying scale model of the well-known cabin monoplane. Other 25c kits in this group include Fokker D-8, Bellanca Liberty, Heath Parasol, Puss Moth, Curtiss Robin. Each kit complete including blueprint and instructions. Now (Plus P. P. 10c) **25c**



S.E.5 4 FAMOUS WAR-TIME MODELS

Including the Sopwith Camel, S.P.A.D., Capt. Rickenbacker's famous war-time fighting ship, Fokker D-7, S.E.5 (illus.) These 4 famous war-time ships are 12" flying scale models. Each kit complete (Plus P. P. 10c) **35c**



AKRON FIGHTER

National offers 18 12" flying scale models: Lockheed Vega (Winnie Mae) Hawk P-6-E, Boeing P-12, Curtiss Falcon, Curtiss Hell Diver, British Hawker Fury, Polish P-6, Sikorsky Amphibian, Texaco Sportster 1931, Lockheed Sirius, Laird 400 Albatross, Pfalz, Bioprop Scout, Fokker Triplane, Akron Fighter (illus.) Each kit complete. (Plus P. P. 10c) **50c**



NEW BEECHCRAFT A-17-F

A 4-passenger high speed ship.

A true 3/4" "National" scale model. Wing span 25 1/2", length 18", wgt. 2 1/2 oz. Colors red and black, silver trimmed. Faithful in every detail including wing and tail centres, deep cowling, navigation and landing lights. Notice the exact detail the photo of this model shows. This new "National" kit contains many simplified construction features: ready turned cowlings and wheels, stations and ribs, and numerous other parts neatly printed on clear white bals, making them easy for you to cut out. The safety motor tube is another feature. Kits contain ample cement, clear and colored dope, Japanese tissue, formed wire parts, props and insignia. Also full size plan with fully detailed instruction. This is a ship every model builder will enjoy building and can exhibit or fly with pride **\$2.50** (Plus P.P. 25c)

Col. Lindbergh's Lockheed Sirius Seaplane

The flying Colonel took his "Tingmissar" over 39,000 miles of Arctic waste. That was FLYING news. National's authentically detailed 1/2" flying scale models of this famous ship is MODEL news. Kit contains many exclusive "National" features for easier construction and better results. Ready turned cowling, all stations printed and numbered to plan. Colors, black and orange, silver pontoon, wing span 21 1/2", length 13 1/2", wgt. 2 oz. Complete kit. (Plus P.P. 15c) **\$2.00**



\$ Win Cash Prizes \$

26 Grand Prizes Including \$75 in Cash Prizes

And Hundreds of Local Prizes

Anyone can enter—anyone can win. Every plane entered gets a prize!

Two Classes:

Junior for Models of 15" and less. Senior for Models of 16" and over. Enroll TODAY. Send 3c to cover mailing for latest catalog and Bulletin of "National" fleet of over 50 planes, and full details and rules of this contest.

Dealers—Agents: Cash in on the 2nd Big National Model Building Contest. Write for special contest offer and full details.

NATIONAL Model Aircraft & Supply Co.

23 Ave. "E", Bluebird Bldg., Dept. A-54, New Rochelle, New York

FREE CEMENT

GIVEN

A large tube of Majestic Cement and free postage on all orders in the U. S. amounting to \$1.00 or over.

FREE

FREE POSTAGE

MAJESTIC balsa is cut of genuine, clear, straight grained stock. It is the strongest and lightest balsa, and guaranteed to be free from any defects.

BALSA

18" Lengths

1/16x1/16.....	20 for .05
1/16x1/8.....	16 for .05
1/16x1/4.....	12 for .05
3/32x3/32.....	10 for .05
1/8 x1/8.....	10 for .05
1/8 x3/16.....	8 for .05
1/8 x1/4.....	6 for .05
3/16x3/16.....	3 for .05
3/16x1/4.....	3 for .05
1/4 x1/4.....	3 for .06
1/4 x3/8.....	3 for .07
3/8 x3/8.....	2 for .05
1/2 x1/2.....	2 for .06
1x1.....	.08

Sheets—18" Lengths

1/32x1.....	2 for .03
1/32x2.....	4 for .07
1/16x1.....	2 for .04
1/16x2.....	4 for .09
1/8 x1.....	2 for .05
1/8 x2.....	2 for .06
3/16x1.....	2 for .06
3/16x2.....	2 for .08
1/4 x1.....	2 for .07
1/4 x2.....	2 for .10
1/2 x1.....	3 for .10
1/2 x2.....	2 for .15

Plank Balsa

1x2x18.....	.12
1x3x18.....	.15
1x6x18.....	.25
2x2x18.....	.20
2x3x18.....	.25
2x6x18.....	.45

PROPELLER BLOCKS

1/2x3/4x5.....	5 for .05
1/2x3/4x6.....	4 for .05
5/8x1 x7.....	3 for .06
5/8x1 x8.....	3 for .07
5/8x1 1/8x10.....	3 for .08
3/4x1 1/8x11.....	2 for .11
5/8x1 1/4x12.....	2 for .13
7/8x1 1/2x12.....	2 for .15
1 x1 1/2x13.....	2 for .16
7/8x1 1/2x14.....	2 for .17
1 x1 3/8x16.....	1 for .15

READY-MADE BALSA PROPELLERS

5".....	.06
6".....	.08
7".....	.10
8".....	.12

ALUMINUM MOTOR PLATES for

1 1/2" Motor.....	.08
2" motor.....	.10
3" motor.....	.12



Majestic
Mechanic
says...

for **QUALITY**
for **SERVICE**
for **VALUE**

Remember...
MAJESTIC

Paulownia Wood Propellers

Size	Standard Style	Steel Type
5 in.	15c	20c each
6 "	20c	25c "
7 "	25c	30c "
8 "	30c	35c "
9 "	35c	40c "
10 "	40c	45c "
11 "	45c	50c "
12 "	50c	60c "
13 "	60c	70c "
14 "	65c	80c "
15 "	75c	90c "

TURNED BALSA WHEELS

1/2" Pair.....	.04
3/4" Pair.....	.04
1" Pair.....	.05
1 1/8" Pair.....	.08
1 1/2" Pair.....	.10
2" Pair.....	.12

SPECIAL BALSA BLOCKS

For Cowlings, Nose Pieces, Wheels, etc.	
2x2x2.....	.06
1x3x3.....	.10
1x3x6.....	.13
2x3x3.....	.15
2x3x6.....	.20
1x2x3.....	.05
1x2x6.....	.10

CELLULOIDE MOTOR DRAG RING COMBINED

3" Diam.....	.45
--------------	-----

SANDPAPER

2 Sheets.....	.05
---------------	-----

RUBBER

The very finest rubber used for model airplanes today. More turns and less weight.

1/32 Sq.....	50 ft. .12
1/16 Sq.....	50 ft. .16
1/8 Flat.....	25 ft. .12
3/16 Flat.....	25 ft. .15
1/2 Flat.....	25 ft. .20
3/4 Flat.....	25 ft. .25

FEATHERWEIGHT ALUM. WHEELS

1" Pair.....	.10
1 1/2" Pair.....	.15

Majestic Sky-Flyer 12" Wingspan

A real all-Balsa glider that will give you many hours of real flying enjoyment. Assembled in one minute.

Postpaid **10c**

DOWELS

Genuine straight grained, birch dowels.

1/16x12.....	.01
1/8x18.....	.01 1/2
3/16x18.....	.02
1/4x18.....	.02 1/2

BAMBOO

1/16x1/4x11. Per Dz. .07

1/16x1/4x15. Each... .01

SHREDDED BAMBOO

1/64x1/64. Doz..... .04

1/32x1/32. Doz..... .05

JAPANESE TISSUE

A light, strong and high-grade material for covering models. Is excellent for doping.

White 20x24.... 3 for .08

Doz..... .27

COLORED TISSUE

A light high-grade material that comes in the following colors:

Yellow, Green, Blue,

Red, Brown, Orange

Sheet..... .05

Doz..... .50

EXTRA FINE TISSUE

20x15..... .05

Doz..... .50

CELLULOIDE WHEELS

Sturdy, light and very neat looking. Used for standing and flying scale models.

1" Pair..... .06

1 1/2" Pair..... .08

1 3/4" Pair..... .11

1 7/8" Pair..... .17

DUMMY MOTORS

Very light, nine cylinder dummy radial engines.

Adds a realistic touch to your plane.

1 1/2" Diam..... .20

2" Diam..... .26

3" Diam..... .35

MUSIC WIRE

Sizes: .014, .020, .028, .034,

2 Feet..... .01

ALUMINUM ITEMS TUBING

1/16 O. D.....ft. .07

1/8 O. D.....ft. .07

3/16 O. D.....ft. .11

1/4 O. D.....ft. .13

DRAG RINGS

1"..... .15

1 1/2"..... .15

2"..... .15

2 1/2"..... .23

3"..... .28

SHEET ALUMINUM

12" Wide, .003.....ft. .12

12" Wide, .005.....ft. .15

N. A. C. A. COWLINGS

1"..... .15

1 1/2"..... .15

2"..... .19

2 1/2"..... .23

3"..... .29

WASHERS

Large Size:

1/4 O. D. Doz.02

100 for..... .15

Small Size:

1/4 O. D. Doz..... .02

100 for..... .15

SHEET CELLULOIDE

Per Sheet..... .05

MAJESTIC CEMENT

The best cement being used in the construction of model airplanes. The quickest drying, strongest, colorless cement on the market.

1 oz. tube..... .13

2 oz. tube..... .17

4 oz. can..... .32

CLEAR DOPE

2 oz..... .13

4 oz..... .25

COLORED DOPE

MAJESTIC colored dope is made of the finest quality ingredients, and is made specially for model plane purposes. Does the job you want it to do.

Red, Blue, Orange, Yellow, Silver, Black, Olive

Drab, Green and White.

2 oz..... .15

4 oz..... .25

BANANA OIL

2 oz. can..... .13

4 oz. can..... .20

THINNER

2 oz..... .11

4 oz..... .18

THRUST BEARINGS

Small .025 hole;

Doz. .20. Each .02

Large .035 hole;

Doz. .20. Each .02

MODEL MAKING PINS

Package..... .05

BRUSHES

Quill..... .01

Camels Hair..... .05

INSIGNIAS

With gummed backs

American Style 3/4" Pair..... .02

American Style 1" Pair..... .03

American Style 1 1/2" Pair..... .05

German Cross 1" Pair..... .03

German Cross 1 1/2" Pair..... .05

French & British Style: 3/4" Pair..... .03

1 1/4" Pair..... .05

Red, White & Blue Stripes

Per Sheet..... .03

PLANS

De Havilland Leopard Moth

20" Flying Scale10

REED

1/16 or 1/8.....1 ft. .01

BUSHINGS

4 for..... .02

PROPELLER SHAFTS

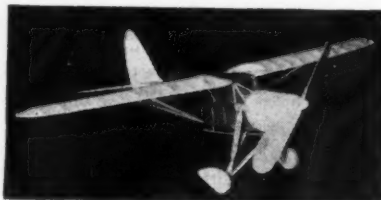
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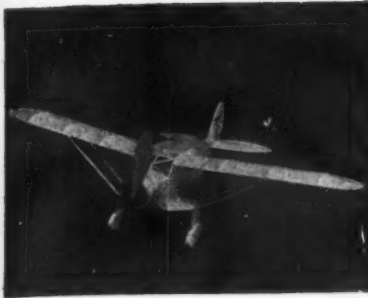
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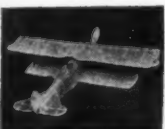
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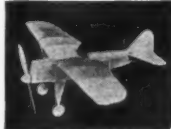
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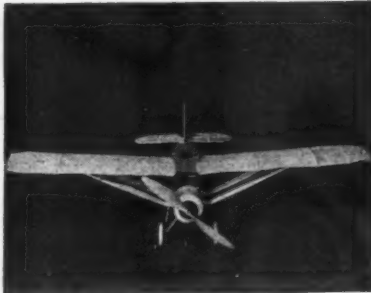
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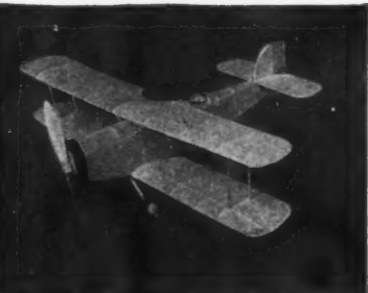
24" BELLANCA25c



24" FALCON, 25c



24" PUSS MOTH, 25c



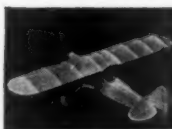
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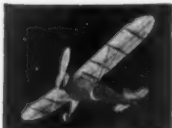
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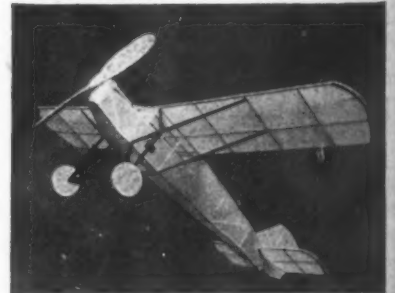
24" NIEUPORT25c



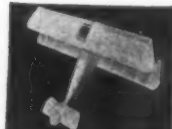
24" AEROMARINE, 25c



24" FOKKER D-8, 25c



24" ROBIN25c



24" SOPWITH CAMEL, 25c



24" S. E. 3, 25c



24" CURTISS JENNY (JN4).....25c

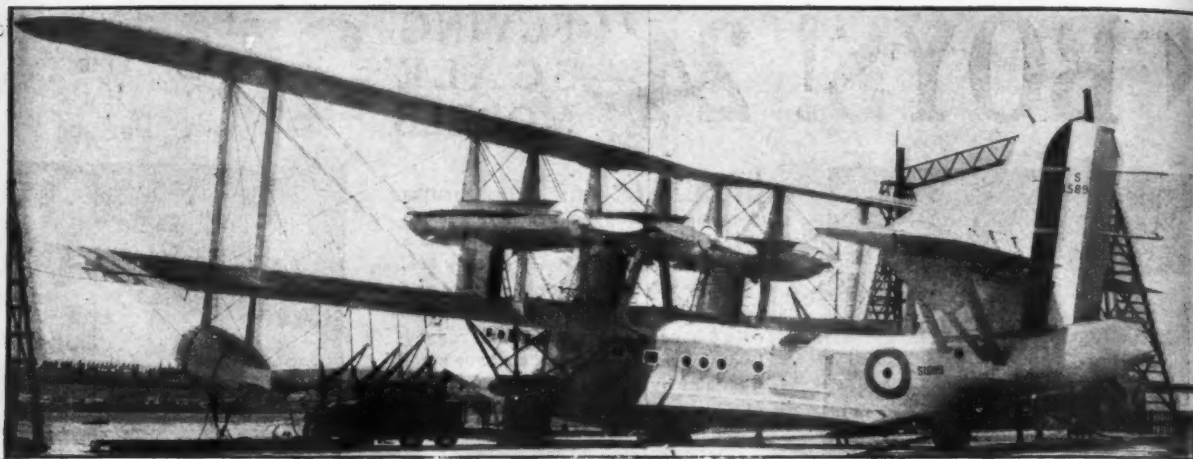
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England's largest flying boat built for long range bombing. It is powered with six engines. (Soibleman Synd. photo)

Here Come the British

How the Distinctive Requirements of a
World Wide Empire Have Shaped the
Development of Britain's Air Force

By FLETCHER PRATT

"THE Government announces that it will build forty-one new squadrons of airplanes," said the British Cabinet's spokesman in the House of Commons. Everyone could figure out what that meant. The latest government return showed that Great Britain's aviation service, which the Parliament was accustomed to consider the greatest in the world, contained 75 squadrons of first-line planes. The announcement meant then, that the biggest air service in the world was going to be made more than half again as large!

The whole house burst into excited whistlings and talk and some of the members stood up to ask what it was all about. "The government," said Stanley Baldwin, acting head of it, "declines to accept a position of inferiority in the face of rapidly expanding air forces in the United States, Japan, Russia and other nations." Just to make certain that nobody misunderstood him, he went on to say, "For air defense, our frontier is not the white cliffs of Dover, but the Rhine," and "The maneuvers show that the bomber will always get through any line of defense if allowed to fly that far."

Now it is perfectly obvious that the United States, Japan and Russia, which had been mentioned first, are not going to fly bombers toward England from the Rhine. They don't own the Rhine or any part of it. Just draw your own conclusions.

That was only a couple of months ago. Most of the forty-one new squadrons are in production now and some of them have already been delivered, with the crews in training already. The fact is that John Bull remembers the Gothas that flew over London in the last war, and the bad luck

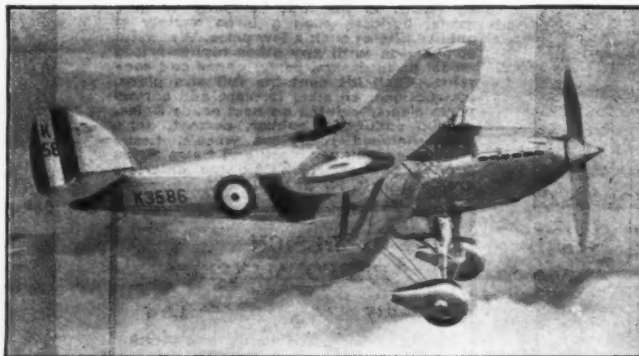
every attempt to stop bombing raids has met with in maneuvers, and has the jitters every time anyone mentions the word "bomber." And John Bull's defense problem with regard to bombers is just a little bit more complicated than that of any other nation on the face of the globe, not to mention the fact that he is a little bit behind all the other big flying countries in certain respects.

It's this way. England is, in area, a comparatively small country. The few great cities and the industrial centers that would make attractive targets for bombing raiders are not protected with rings of mountain and sea like those of Italy, nor hidden far in the interior like those of Russia, nor provided with prodigious rings of anti-aircraft defense

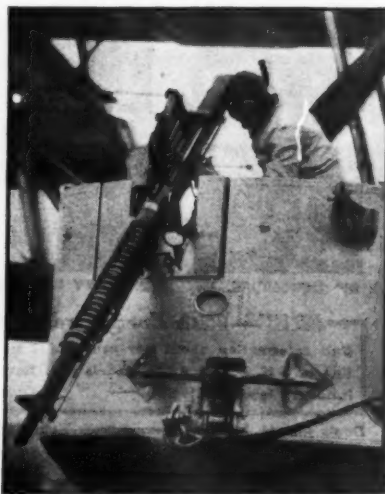
like those of France. They are out in the open where anyone can take a sock at them and they are within easy bombing distance of—the Rhine, for instance.

In view of their World War experience with the Gotha raids the English have given special attention to bombing raids ever since the war. At English air maneuvers for some years, the usual program has been for an aircraft carrier or two, representing the "enemy," to fly off with a couple of squadrons of bombers from some point at sea off the coast. The bombers make for a town or industrial area of their own selection. The air defense people try to spot them coming over and get enough pursuit aviation into the air to stop the raid before it delivers its cargo of explosive eggs, represented in maneuvers by smoke bombs.

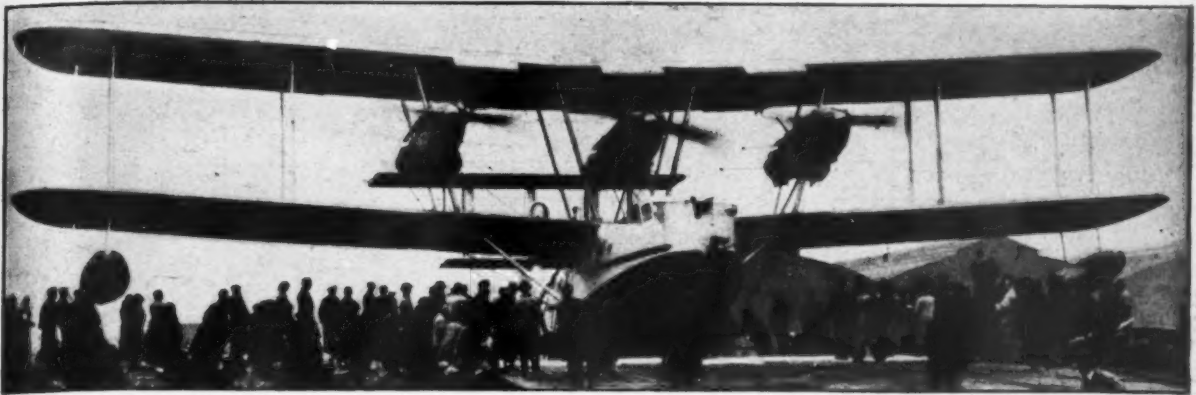
The result has been always the same and confirms the lessons of the war. Before the defenders can locate the bombers and get anything like an efficient force up



The Hawker Super Fury, Britain's fastest airplane. (Soibleman)



1½ pounder on the Perth. (Soibleman)



Launching the Perth, long range bomber. It mounts the cannon on its bow which is shown on page 6. (Soibleman)

to oppose them, they have delivered their packages of sweetmeats and are on the way home. It's very distressing and in actual warfare bombers would complicate life in England enormously.

Now during the World War, the British finally found an answer to the Gotha raids and somebody expressed it in a report that was a little classic. What it said, in substance, was this—"Hostile bombing raids can be prevented only if the bombers are attacked by sufficient pursuit aviation before they reach the English coastline." It worked during the war; the English got into the habit of keeping enough observation ships in the air to spot an oncoming Gotha raid just as it left the ground, and attacked it there. After that the raids on London stopped. It works during maneuvers. When the defenders spot the "enemy" aircraft carrier at sea and jump the bombers just as they are leaving her decks, the bombing raid goes pfft.

So England feels it must have an air service big enough and good enough to stop serious bombing raids before they can get off the ground, or at least kill off the bombers before they reach the coastline. Once you get that idea straight, you can understand the whole organization of the R.A.F., the Royal Air Force.

Take the very fact of there being a Royal Air Force, which combines both naval and military aviation under a single head. For most nations this idea won't do. Working with a fleet far distant from shore, flying off catapults and carrier decks, handling big flying boats, involves a kind of training that men who fly off landing fields have no use for, and vice versa. The United States, France, Japan, Russia, all keep the two types of aviation separate. But England, earliest of all nations, way back in 1915 threw the whole air defense question into a single department, and for English conditions they were perfectly right. The duty of both army and navy aviation in England is to protect the coastline.

She has the best navy in Europe and is sure of command of the sea in any war. As far as she is concerned, the sea becomes a kind of extension of English territory. When the enemy comes, both army and navy planes will be in the air against him at the same time. The English fleet, protecting its coastline, doesn't get far from home. A pursuit plane from one of their carriers

It is the peculiarity of their defense problem then, that makes the British build enormous numbers of airplane types no other nation will have at any price and to omit from their air service altogether certain types to which other nations give a good deal of attention.

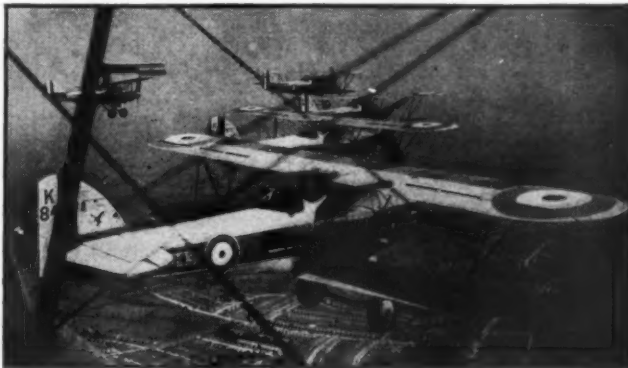
Suppose we have a look at some of these types. To begin with, there are the "fighters", which we call "pursuit" in this country. The R.A.F. has two types of fighter; the single-seaters which they call "interceptors", and the two-seater fighters which have no parallels in most other services.

The interceptors of the R.A.F. are of two standardized types; the Bristol Bulldog and the Hawker Fury, or in the latest improved versions, the Bristol Bullpup and the Super-Fury. Both of them are perfectly "normal" machines; single-seater biplanes; the Bullpup with a radial engine hidden behind a cowl; the Super-Fury with a 12-cylinder Vee engine be-

hind its pointed snout. Both of them, and all English military ships generally, are built up of welded steel tubing as a frame, the rest of the structural members being of wood and the covering fabric—composite construction.

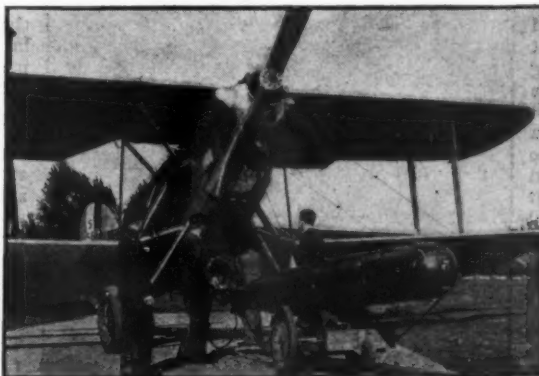
The Bullpup has N bracing between its wings, the Super-Fury V bracing. Both have the old-fashioned double lift wires and the old-fashioned solid undercarriage with a good, solid axle. And both will do (according to their builders) around 250 miles an hour with full military load. "Oh, yeah?" says you, "and what about all the drag of biplane wings and bracing and undercarriage? How do they do it?" Just stick around, we're coming to the explanation of that in a minute. At any event, you can take it that the figures are fairly accurate and that beside having high speed, these British fighters are wonderful climbers.

The part these interceptors play in the R.A.F. system is just what their name indicates; they haven't a great deal of endur-

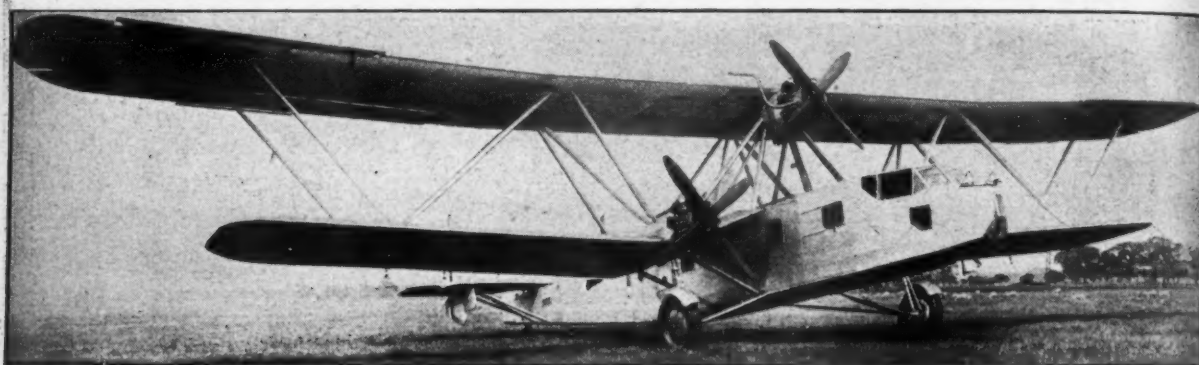


Hawker Demon Fighters during maneuvers. (Soibleman)

can usually land on a beach in an emergency and if it isn't handy for the plane to find mamma-ship again, it can hook up with a land-based force. Similarly, a land plane drawn out over the water in some dog-fight, can usually find a British naval vessel underneath if it wants to come down and sit on the water for a while.



Loading a torpedo on the torpedo plane Ripon; one of the navy's deadly weapons. (Soibleman)



A Handley Page troop carrier. It carries thirty men and crew. (Royal Air Force Official Photo. Soibleman)

ance, but are supposed to take to the air quick when word is flashed by radio that a bombing squadron is headed for a certain point, and to be on hand to intercept the bombers, either on their way in or on their way back home. They are good stunts. In the last return, the government listed 5 squadrons of interceptors, but a few more have been added since and several of the 41 new squadrons are understood to be of this type.

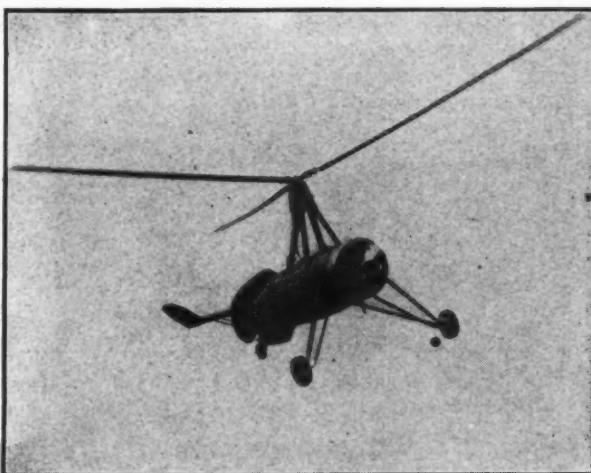
The two-seater fighters are the distinctive feature of the R.A.F. just as the monster four and five-seater aerial dreadnaughts are the characteristic feature of the French. Most of the two-seaters now in service are of the Hawker Demon type, which is practically a two-seat edition of the Fury, with an extra pair of machine-guns mounted for rear fire and much enlarged fuel tanks to give greater endurance. The interceptors have to give away too much in other characteristics in attaining their climb and speed to be of much use for long-distance work, hence the two-seater was developed for general battle purposes.

Their job is to be in the air alone; they back up the scouts and they are the boys who are supposed to attack enemy bombers as they leave the ground. As they will have to tackle heavy squadrons of these ships, in good formation and presumably well protected by pursuit aviation, they have to be real fighters, capable of smashing right through a screen of pursuit and taking care of themselves under the fire of the many machine-guns bombers carry. Hence the R.A.F. adds the extra machine-guns at the rear and a man to handle them. There has been a good deal of secrecy about the Demon, but she is supposed to do about 200 to 210 miles an hour under her military load and will climb to 10,000 feet in less than 7 minutes, which is plenty good performance. The R.A.F. has a naval version of the same ship, called the Osprey, for work as a shipboard fighter. The main difference is that she has folding wings and is not quite as fast as the Demon.

These two-seater fighters are sup-

posed to carry most of the load of the war in the air; to be able not only to beat up enemy bombers, but also to protect British bombers on long raids, and with their fine speed, heavy armament and good maneuvering qualities, they would make quite

a problem for anybody's pursuit ships. Eight squadrons of them are now in operation, with more building, and many of the next type, the "general purpose" machines, are being replaced by two-seater fighters.



A wingless autogiro, recently developed and used by the British Command. (Soibleman Syndicate Photo)

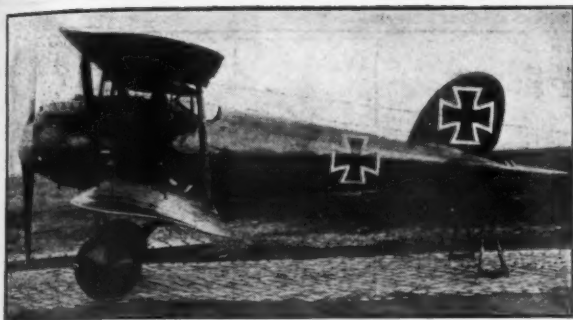


The latest experimental British fighter. Note the gunner's seat at the rear. (International News)

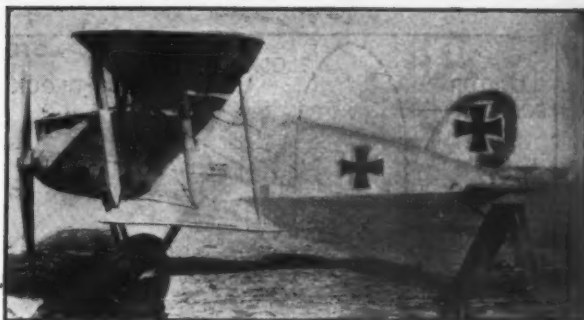
As for these "general purpose" machines, themselves, they are just that, and in describing them one has to describe the other major problem of the R. A. F. In addition to protecting one of the most sensitive coastlines in the world, it also has on its hands the duty of providing air protection for the far-flung system of Imperial communications. The big British Dominions, Canada, South Africa and Australia, have air forces of their own, with which we are not concerned for the moment. But India, the great English possession and the colonies on the air-sea route to India (Malta, Gibraltar, Aden, Iraq, Cyprus and Egypt), are provided for out of the R. A. F.'s own allotment. It would be an insupportable burden for the English to keep up full air service of many different types of machines for all these points, especially since they have aircraft industries of their own. So most of the machines posted along the route to India, 23 squadrons of machines, over 450 planes, must depend upon what resources can reach them by sea or air in case of war. The result is that the machines can't be specialized; they must be general types in which high performance is less important than ease of repair.

Beside this colonial work, the R. A. F. general-purpose machines fulfill the role to which observation planes are assigned in the American service. They are supposed to do the scouting against enemy bombers, to locate them and flash the word for the two-seater fighters. The weight allowance which the interceptors put into speed and climb and the fighters into speed and fighting equipment, they expend on radio, cameras and that sort of thing. They have bomb racks for a light load, (500 pounds), many of them are provided with torpedo racks, and practically all can be used for general liaison work.

(Continued on page 36)



The D-7. 195 h.p. 3 Vb Benz engine; speed 140 m.p.h. (1917)



The D-9. 160 h.p. Mercedes engine; speed 130 m.p.h. (1917)

The Albatros Fighters on Parade

Part 4

IT SEEMS quite logical that the reign of the triplane followed the Richthofen regime to a glorious death. However, triplane fighters as well as single-seater biplanes of Richthofen's era were used for front line service up until the close of the war.

The Albatros D-5a for example, is known to have first appeared ten months before the Red Knight was killed in his Fokker Dr-1; yet, some of the war writers have given the Albatros D-5a as late an initial production date as June 1918, after Manfred von Richthofen's death.

True to fact, it is interesting to note that the D-5a as well as the Fokker Dr-1 were first ushered into the makeshift hangars of the German Imperial Air Service in 1917. In accordance with things learned in battle-heats of the following months, these famous machines were more or less modified and gave efficient service up until the signing of the Armistice documents.

Succeeding the Albatros Dr-1, and during the time when the engineers of the Albatros-Werke were applying most of their energy and skill in experiments with different engines and structural designs, the Albatros D-7 was produced.

The D-7, serial number L-37, came out in August 1917. At that stage of the war, D type production in the Albatros works was farther advanced than in any of the other outstanding warplane plants working for Germany. The Roland and Fokker works especially, were still lagging a bit behind. At this time moreover, the Kommandierender General der Luftstreitkräfte von Hoespner still believed that Fokker had nothing that could compete with the Albatros which was number A-1 fighting plane of the Empire. Later however, the Pfalz, Fokker and Roland machines competed strongly.

As we view the general appearance of

Little Known Details and Facts Concerning Two War Planes That Established German Air Supremacy for the First Time in 1917

By JOSEPH NIETO



A Nieuport two-seater triplane, used by the Allies against the Albatros triplanes, 1917. (110 h.p. Clerguet engine)

the Albatros D-7 in all its wartime splendor, we note its striking resemblance to the earlier D-1 of the same name. There was as much difference between these two machines however, as would be found in viewing the sun and the moon. Outstanding and most effective characteristics displayed by the D-7 show the great advancement registered by this machine during the short time of production since the advent of the D-1.

The D-7 was the most practical and maneuverable single-seater of the Albatros "D" series and probably the most sensitive biplane of its class produced by German engineers during the entire period of the war.

In this as well as the succeeding D types, the tail planes were compensated with lower incidence angles corresponding with the most convenient direction of attack when executing power dives. A feature in the D-7 that should well have been applied to the Albatros prior to this time, turned into a warplane "savings account" at the expense of the Allied "depositors."

In comparison with the same though later famous type in the Fokker line, we have but to note the stream lines of the Albatros against the angular forms of the former. Moreover, the stronger "V" type

engine employed in the Albatros D-7 as well as other exposed parts around it were practically enclosed to the air-stream. In addition, the Albatros possessed greater wing area in ratio to the span, two more ailerons and a most practical tail assembly.

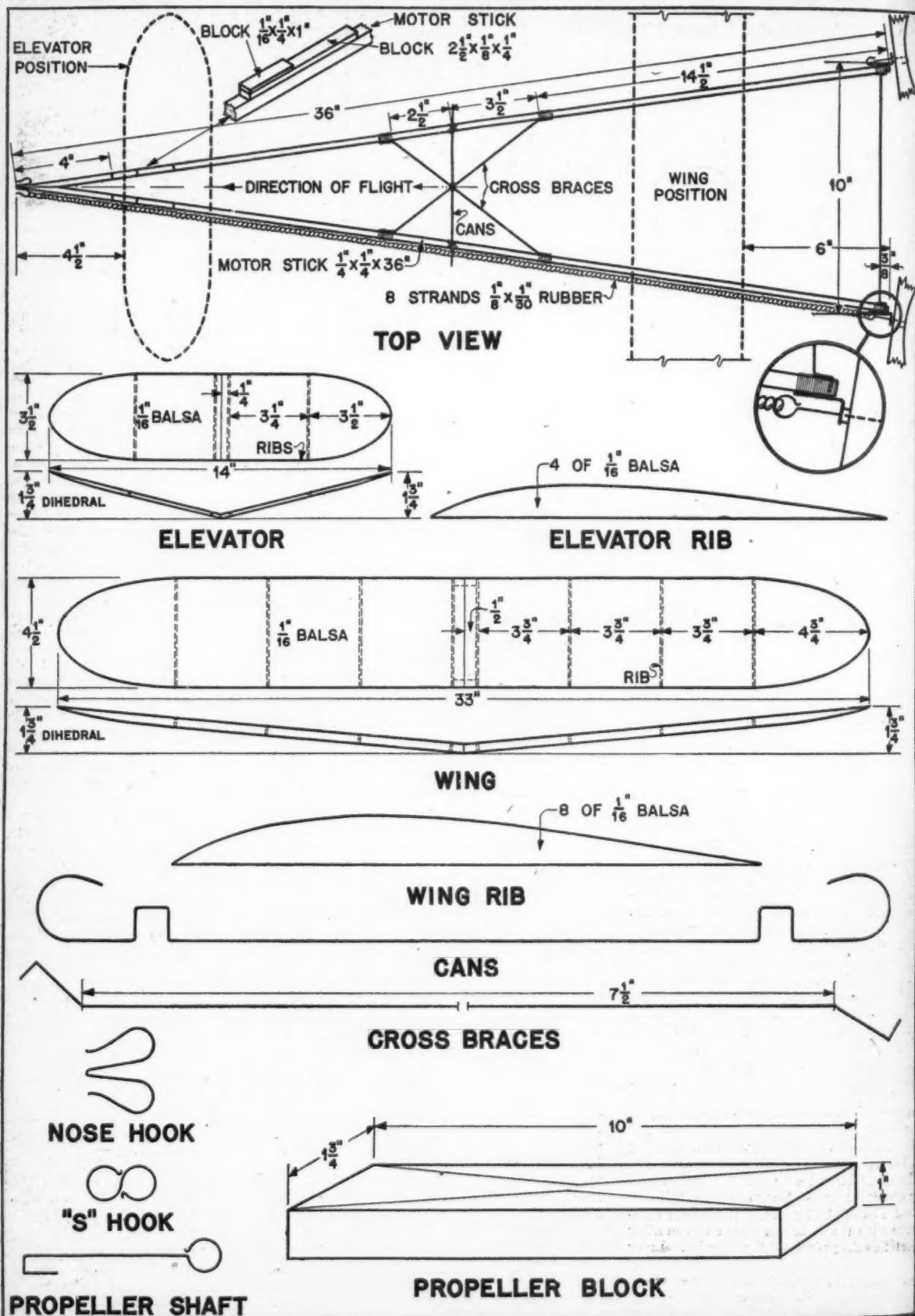
In taking up the description of the Albatros D-7, the fuselage which was the last of *monocoque* form used in the Albatros "D" series, was of the same construction and dimensions as that employed in the preceding type, with exceptions at the nose and under the tail. Owing to the experimental installation of the 195 h.p. Benz 3Vb engine, this section was slightly disturbed in forming a perfect "bullet" nose.

The conventionally large spinner was attached to the root of the same "Axial" propeller that pulled the Dr-1. Three main longerons on each side of the body were attached to thirteen D-5a form fuselage members which shaped the body to a "split" cone at the tail. As in the preceding type, the entire fuselage was covered with plywood veneer and treated linen with exceptions at the nose, where aluminum casings and inspection plates were attached ahead and just below the front part of the engine.

Under the horizontal tail planes at the section where the lower vertical fin connected with the body, a groove was provided for the setting of the tail skid piece which in this case was connected to an enclosed shock absorber. The wings of the D-7 presented characteristics derived from D-1 and Dr-1.

These had the D-1 lines, practically the same dimensions and the airfoil of the Dr-1. The upper wing was built up as a single complete unit with no dihedral angle. The angle of incidence varied from 5° at center to 4° at the left wing tip and 2° at the right tip.

As in preceding types, the main spar
(Continued on page 38)



Fundamentals of Model Airplane Building

A Complete Course for Beginners Who Wish to Become Expert. How to Build an All Balsa Twin-Propeller Pusher Model—Part No. 8



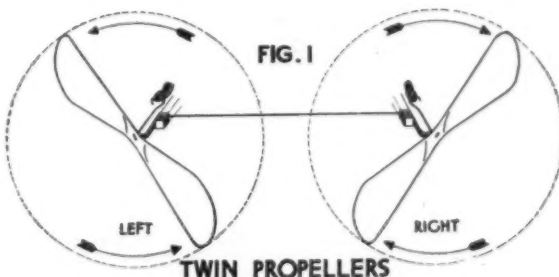
This is the best way to launch the twin pusher

AS OUR eighth airplane model of this series, Mr. Grant has designed the first twin-propeller pusher to appear in this course. As will be noted, we have kept solely to all-balsa models to date and so the one shown here continues that type of plane. This is done as part of a set program, to fully acquaint the beginner with all types of flying models of solid construction before taking him into the more difficult field of built-up construction.

One of the most outstanding features of this model is its exceptional soaring ability which permits it to continue in flight long after normal propulsion by motor has ceased. On test flights, it has remained in the air over two minutes and flown a distance of two thousand feet.

With these unusual flying qualities, it nevertheless is of such simple construction that the amateur can easily build it. The use of solid balsa wings eliminates the tedious operations of built-up framework, which necessitates a large number of ribs, intricate assembly and the covering of the structure with tissue.

By EDWIN T. HAMILTON



It represents the logical step toward contest models of like type and the beginner should find it a stimulating and interesting building problem without the usual expert workmanship being required. Flying the model will bring its builder experience which will prove not only valuable but absolutely necessary when tackling the launching, flying and handling of contest planes.

It must be kept in mind that the whole worth of this course is to develop the rank amateur into a well grounded, well informed expert. The entire course has been laid out by your editor, Mr. Grant and the writer on this basis. Don't shirk . . . don't "skip," and you'll find that we have lived up to the usual standards of UNIVERSAL MODEL AIRPLANE NEWS in giving its readers only the best.

A-Frame

In a twin-propeller model of this type, the fuselage is known as the "A-Frame." This is because it is built to the general lines of a capital "A." Such models are often referred to as "twin-stick pushers." They are essentially outdoor models and have set up some of the finest flight records known in the model airplane field.

Two balsa sticks, measuring $\frac{1}{4}$ " square and 36" long, form the framework of the fuselage. These are joined together at the front end and spread apart at the rear or trailing end, by wire. Cut two sticks to this size, sandpaper each carefully and test to see that both are exact duplicates.

A miter joint is cut at one end

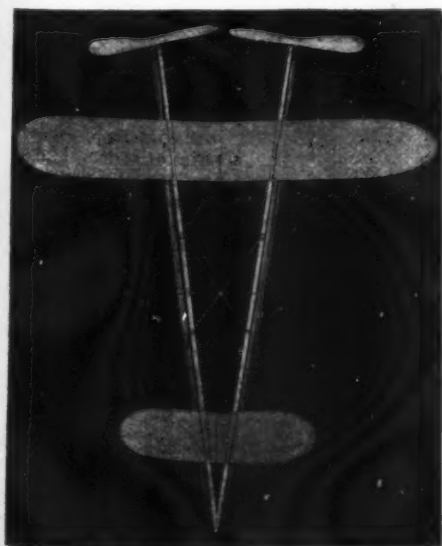
of the sticks, so that when they fit together, the trailing or opposite ends will be exactly 10" apart when measured from outside to outside of the sticks. This can be seen in the plans under "Top View." Lay both sticks in proper position and then cement their front ends together. Before applying the cement, squeeze the front beveled ends together and then measure the distance the rear ends are apart. If they are 10" from outside to outside, or $9\frac{1}{2}$ " from inside to inside, the beveled ends may be cemented together. Hold them in place with a model pin or a rubber band until the cement dries.

Four piano wire braces are used to hold the frame in proper form. The two cross braces and the combination cans and center brace are all bent from $1/32$ " diameter wire, which is approximately a No. 13 piano wire. The trailing end brace, because of added stress, should be bent from $3/64$ " wire. This is about a No. 21 gauge. If you cannot purchase wire of this diameter, do not use any of less diameter than a No. 16, which is .037".

Bend the two cross braces, as shown in the plan under "Cross Braces." This plan is given full-size except for its length which had to be cut down. It is $7\frac{1}{2}$ " long from bend to bend, as shown.

The third bracing wire which is bent to form a "can" on each end, is shown

(Continued on page 40)



The completed all-balsa twin pusher ready to go places

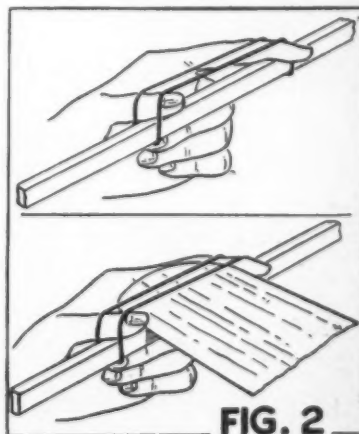
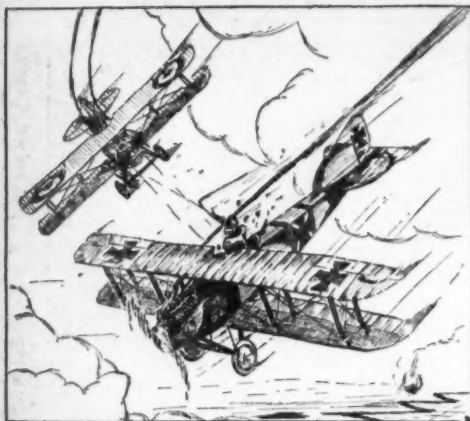


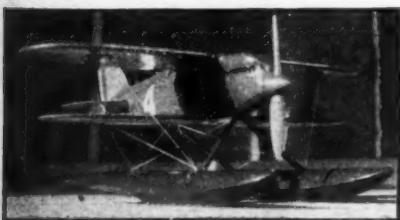
FIG. 2

AIR WAYS HERE AND THERE

What Readers Are Doing to Increase Their Knowledge of Aviation in All Parts of the World. Send Pictures and Details of Your Experiments



Pict. No. 1. Marvin Johnson gives you this conception of a fight between a Spad and an Albatros



Pict. No. 2. A detail scale model of the Schneider Cup Racer of 1925, the Curtiss R.3C-3, by Wm. Howell



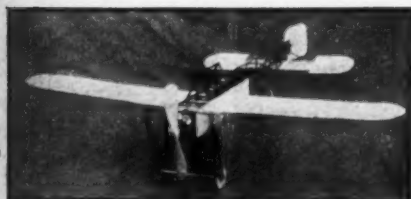
Pict. No. 7. A squadron of model Hawker Furies, built and well posed by Ray Grout



Pict. No. 5. H. O. Buckey and his beautifully built gas model



Pict. No. 9. Wm. Satel's model No. 5 (Fundamentals of Model Airplane Building) in flight



Pict. No. 4. A model of the historic cross channel Bleriot, by Doug Alkire



Pict. No. 10. A close up of Wm. Satel's remarkable flier



Pict. No. 8. Model Boeing transport by J. G. Wheeler. First prize at the Victoria, B. C., Motor Show

WE WONDER how many young men realize what great benefits they are receiving from following this wonderful hobby of model airplane building. The fact that calls this point to mind is the great improvement in the quality of the work of many of our regular Air Ways contributors. It is hard to believe that in many cases the builders of these remarkably fine ships are young men in their 'teens. We can assure them that they will not regret the time and energy spent in their model work. It will repay them dividends later in life. Without knowing it they are training their minds and hands to perform tasks later which will be very difficult had they not entered wholeheartedly into this great activity.

We have a new artist contributing to Air Ways this month, Mr. Marvin Johnson of 2121 Palm Grove, Los Angeles, California. He has presented us with the sketch at the head of the column which shows a vivid portrayal of a Spad attacking an Albatros, as it is diving into a cloud. The drawing shows a fine technique and sense of proportion.

One of our old contributors, Mr. William T. Howell of 9202

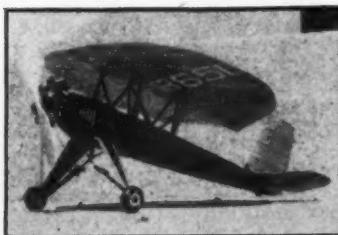
Hayes Boulevard, Detroit, Michigan, sends us a picture of a machine many of you are not familiar with, picture No. 2. It is a detailed scale model of Major Doolittle's Curtiss Schneider Racer of 1925, the R.3C-3. The ship is entirely built up and covered with silk, although it looks solid. Howell is testing this model in the University of Detroit wind tunnel. You see, there are many uses to which you can apply your model building art.

Howell is stepping along in his aviation career for he is now learning to fly. He says, "I was flying a Bird Biplane but have changed to an Aeronca C-3 which I like very much. I soloed in the Aeronca. I will be glad to answer any letters from fellows interested in learning to fly." In making this statement Mr. Howell is either a very brave man or an excellent typist. We will give the names and details concerning those hurt in the rush later.

Here is a new one. It is the first model we have ever seen of the Nemeth Round Wing plane, shown in picture No. 3. Charles W. French, Jr., of 3 Linnaean Street, Cambridge, Mass., is its builder. He says, "The ship performs exceedingly well in the air, making beautiful landings and take offs. At times it reaches an altitude well over fifty feet. It is unusually stable laterally and longitudinally. It has a steep angle of climb and is practically stall-proof. I am sorry I have not a flight picture to send."

If any readers would like to see plans of this ship in the magazine, please write to the editor.

Some time ago we ran a series of articles in the magazine entitled, "How The Aeroplane Was Created." One of the objects of presenting these articles to readers was to give them an idea of the early types of machines and provide them with



Pict. No. 3. Charles French Jr., designed and built this unusual model of the Nemeth Round Wing



sketches and plans from which they might build a series of historical models. Such a collection would indeed be valuable.

It seems that one of our readers at least, has taken advantage of this in part. Doug Alkire of 520 North Moore Avenue, Monterey Park, California, has built the Bleriot Cross Channel Monoplane, shown in picture No. 4. This was a famous machine. He says, "The model was built accurately from plans in your magazine, to a scale of one inch equals one foot. I have followed out carefully all of the riggings. The controls are movable and exactly the same as on the big ship; even the full number of ribs are in the wing, tail and rudder. The model boasts also of a motor and gas tank with gasoline lines."

Many model builders have the idea that these old ships are more or less freaks and ridiculous. However, possibly they do not realize that they were works of art, considering the amount of power that was available in the engine for flight. The performance of these ships with their small power, is truly remarkable and required the highest form of engineering. The only thing that is out of date in many of these ships is the construction.

It seems that gas powered models are keeping pace in development with their full scale brothers, for H. O. Buckey of 409 South Highland Avenue, Baltimore, Maryland, has built an all-metal, low-wing gasoline model of seven foot wing spread. Mr. Buckey is shown in picture No. 5, holding his ship. Mr. Buckey says that he developed this in 1930. As far as we know, this is the first all-metal gasoline powered model to be constructed. However, the important thing about these models is their flying ability. Mr. Buckey says very little concerning his flying experiences with his ship. We would be interested to know how this model has performed. If we might hazard a guess, we would say that the ship would not put up a very commendable perform-

ance for several reasons. They are as follows:

First, there is practically no dihedral and on a gas model ship of low-wing design, considerable dihedral is absolutely necessary. Second, the stabilizer and fin are quite small and close to the wing. This produces erratic flights or prevents a flight of any kind. The experience of builders who have tried to fly ships of similar design has been that the plane spiral dives, stalls or spins, as chance might dictate. This ship evidently has been built to the scale of a large airplane, or close to it. From this, one may judge the amount of natural stability possessed by large ships today. If this model is unstable, as similar ones have proved to be, large ships will probably be unstable also. Usually the pilot in a large airplane is the only factor that keeps it on a level flight course.

Now we have a treat for you, supplied to us by Mr. Howard Roberts of Fresno, California, Route 1, Box 419. It is picture No. 6, which shows two practical Rocket model planes built by Mr. Roberts. He has supplied us with very few details. However, from the picture the general type of model used for this purpose can be determined. An unusual feature is the set of

(Continued on page 30)

Pict. No. 6. Here are some new ones! Two unusual rocket planes by Howard Roberts. Note the position of the tail planes set to the side of the Rocket streams



Pict. No. 14. A nine foot span gas model built by C. A. Philpott of England. Flight Lt. G. B. Bolt built the 2/3 h.p. engine



Pict. No. 11. An exact detail scale model of a Foch-Wulf by Elbert Weathers. It is built to fly



Pict. No. 17. Fred Buckenberg of the Bamberger Aero Club shows the unusual features of his gas model to Lieut. H. W. Alden, head of the Junior N.A.A. and Casey Jones of the Casey Jones School of Aeronautics



Pict. No. 15. France becomes model airplane minded and holds a competition at Vincennes



Pict. No. 12. An action photo of a remarkable racing model by Elbert Weathers



Pict. No. 13. C. Finlayson's Comper Swift in flight. It is built to exact scale. Weight .2 1/4 oz.



Pict. No. 16. Louis Shumsky of the Atlantic City gas model club, and his fiery cloud chaser



Completed model of the Douglas 043-A



Details of cockpit and bracing are complete

Build the Douglas 043-A

Full Instructions to Build and Fly a Flying Scale Model of the Latest U. S. Army Observation Plane

By HOWARD G. McENTEE

THE model we are now to make is called the 043-A. It is a two-seater observation ship of very high performance. There has been a long series of these ships built, each succeeding one with some worthwhile change, until the highly efficient ship as it now stands, was created.

Due to the use of an in-line, liquid-cooled engine, the streamlining of the fuselage is very fine with its narrow nose and small faired radiator. There are two radiators, one just back of the nose and below the fuselage, and the other, a larger one, for the Prestone cooling system, also below but somewhat farther back between the landing gear struts.

The landing gear is of the latest single strut type, the upper ends of which are well streamlined into the body.

The ship is very good from the model builder's viewpoint because of the high wing and large fin, which make for fine flying qualities.

The original ship carries a pilot and gunner or observer. The gunner is provided with the usual flexibly mounted guns to the rear of his cockpit. The position of the stabilizer, set in the fin and quite a ways above the fuselage, provides very fine visibility aft and as a result any attacking ship would have a dangerous job to get in the coveted "under the tail" position.

Some of these ships are equipped with a sort of turret which is seen just below the observer's cockpit. On others, this turret cannot be seen.

The ship is powered with a 675 h.p. Prestone cooled motor. The performance figures are of course kept secret, but keeping in mind the high power available and the excellent streamlining used, the top speed must be around 200 m.p.h. or over.

The fuselage of the 043-A is metal-covered, and to simulate this properly and get the smooth appearance, we use the hollowed out balsa construction.

For those who have not tried this type of building, it is really not as difficult as it may seem and the writer believes that it is much

easier than the built-up type. Once the balsa block is selected and prepared, the fuselage can be made in an evening, completely finished and ready for the attachments.

Two blocks $2\frac{1}{2}$ " x 1" x 13" are needed. Care should be used to select smooth, soft wood and not the harder stringy variety which is not as easy to cut. The blocks are *lightly* glued together, spreading the glue only along the center line of the blocks. This is done so that they will come apart easier when the fuselage is finished on the outside. The blocks should be clamped together or put under weights to dry. When dry, we are ready for the actual carving. Trace out the outline of the finished fuselage on the top of the block and cut to size. When this is done, repeat with the side outlines and cut to shape. The best way of doing this is to cut the patterns out of stiff paper and trace around the paper on the block.

We now have a block whose cross sections are all rectangular, but whose outlines are those of the finished fuselage. The next step is to round the edges off to the finished form. This should be started with a sharp knife, but after the first rough cuts are taken, coarse sandpaper should be used, as with this it is impossible to gouge too deeply and spoil

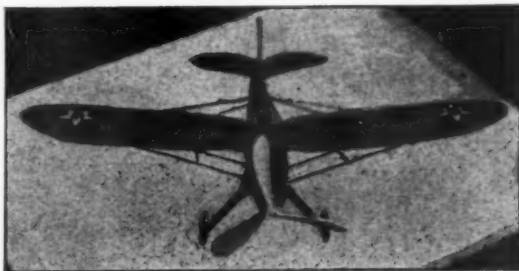
the block. Several templates are given on the drawings from which cardboard templates can be prepared and which will be a big help in getting both sides alike. The finishing off of the fuselage block should be done entirely

with sandpaper, using finer and finer grades until the surface is very smooth. When this is completed, give the whole block a good coat of banana oil, which will of course raise the grain of the wood somewhat. Allow this to dry thoroughly, then sand again to a smooth surface. The block can now be split along the joint, using a razor blade only, never a knife.

The hollowing out can be done completely with a single $\frac{3}{8}$ " gouge. It should be sharpened very frequently with a slipstone as the ease of the job depends to a great extent on the sharpness of the gouge. The walls may be cut to a thickness of $\frac{1}{16}$ " from the cockpit back and $\frac{1}{8}$ " forward. The nose section should be left quite thick to give strength and to balance the finished model. By holding the shell up to a strong light, any thick places may be spotted and cut down. The work can be smoothed down with sandpaper, but there is no need to try for a glass smooth surface, except the section at the cockpit and this should be well smoothed.

The three bulkheads may now be cut and glued in place. They are made in halves and must be cut to fit. No sizes are given for them on the drawing as every model will be slightly different in cross section. The centers must be cut out large enough to allow the rubber free passage without touching. The front two bulkheads, 1 and 2, should be of fairly hard $\frac{1}{16}$ " stock; the rear one, 3, may be of $\frac{1}{32}$ ".

When the bulkhead halves are well dried, the two sections of the fuselage are ready to be fastened together. Spread glue all around on the edges of one of the halves and on the bulkhead halves of that side. Then place the two together. A single pin stuck through the two pieces, front and rear, will keep them in line. A length of $\frac{1}{4}$ " rubber may then be wound around the



Though it has a flying propeller the proportions are not destroyed

fuselage to hold all parts of the joint together. When dry, this may be easily removed as the glue will not stick to it. The joint is then sanded for smoothness. If a good job of gluing has been done, the joint will be practically invisible.

The fuselage is now completely covered with thin tissue, the regular paper used

for covering models. It is cut in strips $\frac{1}{2}$ " wide, cutting along the grain. The strips are applied lengthwise, using banana oil for an adhesive. Use plenty, for the paper must be soaked through for a good job. The paper is smoothed while wet with the fingers and of course, small wrinkles will be formed. These are flattened as much as possible while the paper is still wet. Where the fuselage curves are rather abrupt, such as at the nose and around the radiators, vee cuts may be made and some of the excess paper removed. This results in a much smoother job. Do not overlap the pieces very much as it results in a rather sloppy job.

When the covering is complete, go over the whole job with another smooth coat of banana oil, and when this has thoroughly dried,

sand lightly with very fine paper. This serves mainly to smooth the wrinkles and other small irregularities which are unavoidable.

If the above work has been well done, a remarkably smooth, shiny surface will be the result. The finish is just as smooth and much lighter than many methods using wood filler. This method of finishing has been used for a long time, but is not as well appreciated nor as widely used as it should be.

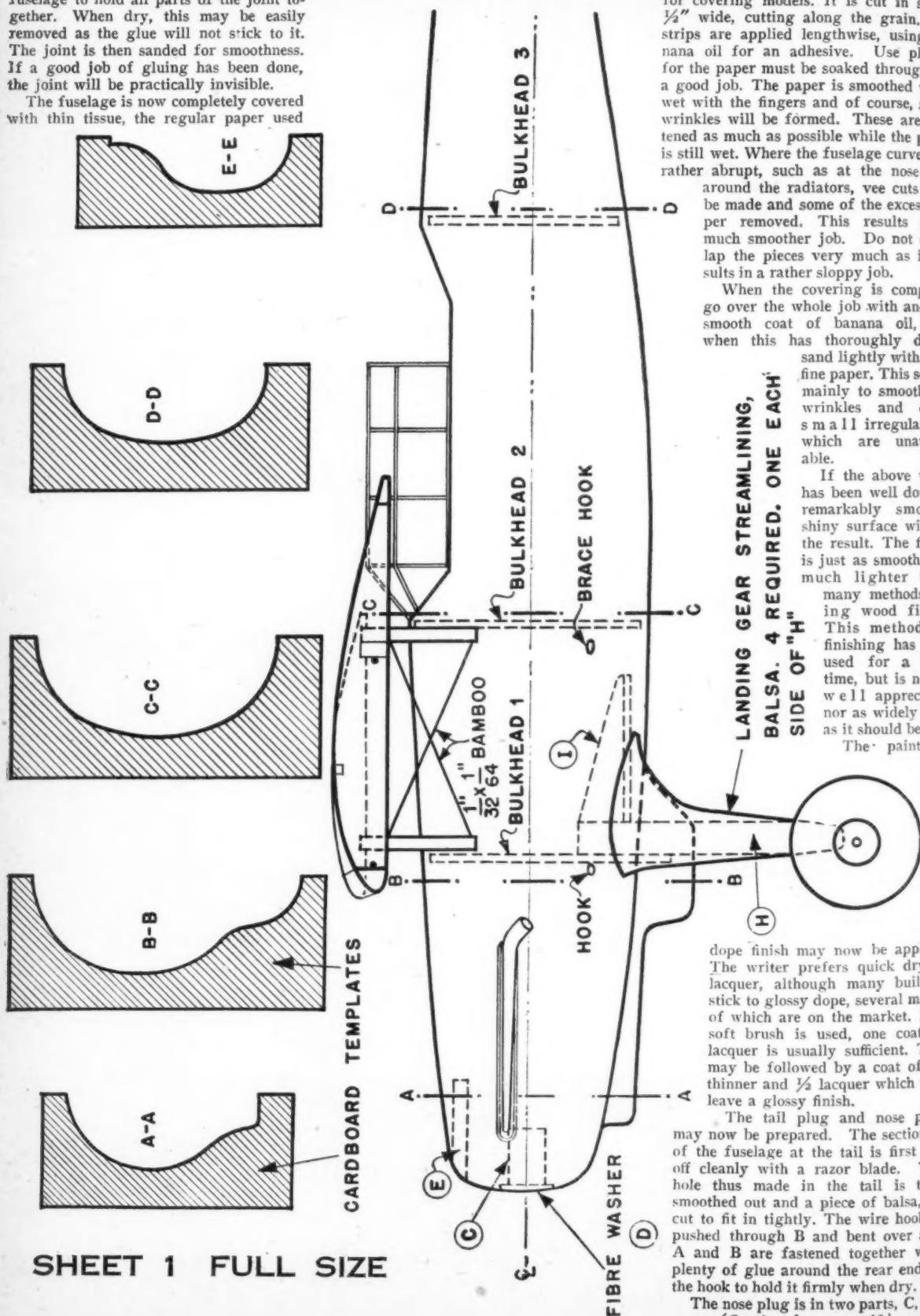
The paint or

dope finish may now be applied. The writer prefers quick drying lacquer, although many builders stick to glossy dope, several makes of which are on the market. If a soft brush is used, one coat of lacquer is usually sufficient. This may be followed by a coat of $\frac{1}{2}$ thinner and $\frac{1}{2}$ lacquer which will leave a glossy finish.

The tail plug and nose plug may now be prepared. The section A of the fuselage at the tail is first cut off cleanly with a razor blade. The hole thus made in the tail is then smoothed out and a piece of balsa, B, cut to fit in tightly. The wire hook is pushed through B and bent over and A and B are fastened together with plenty of glue around the rear end of the hook to hold it firmly when dry.

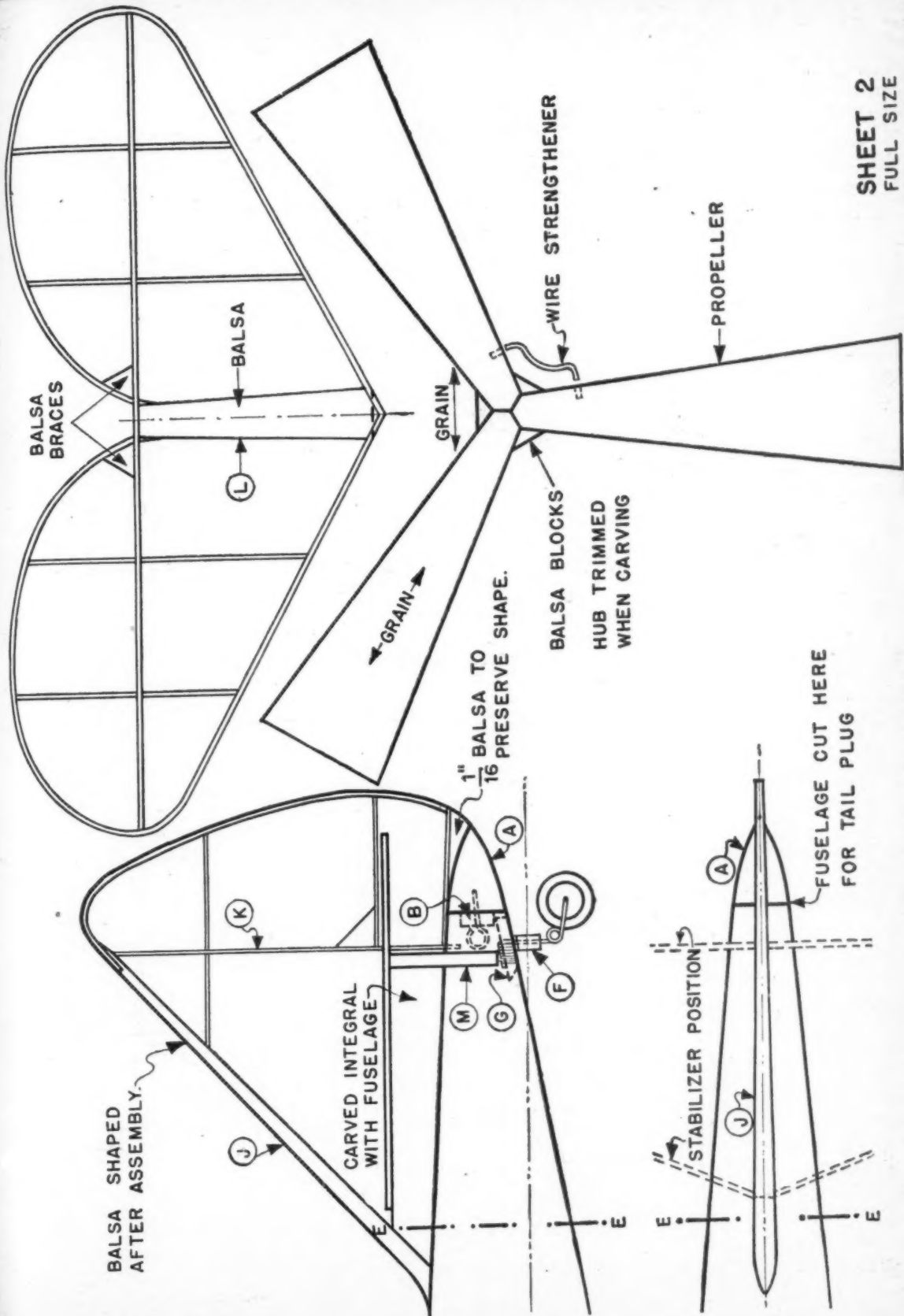
The nose plug is in two parts, C, the

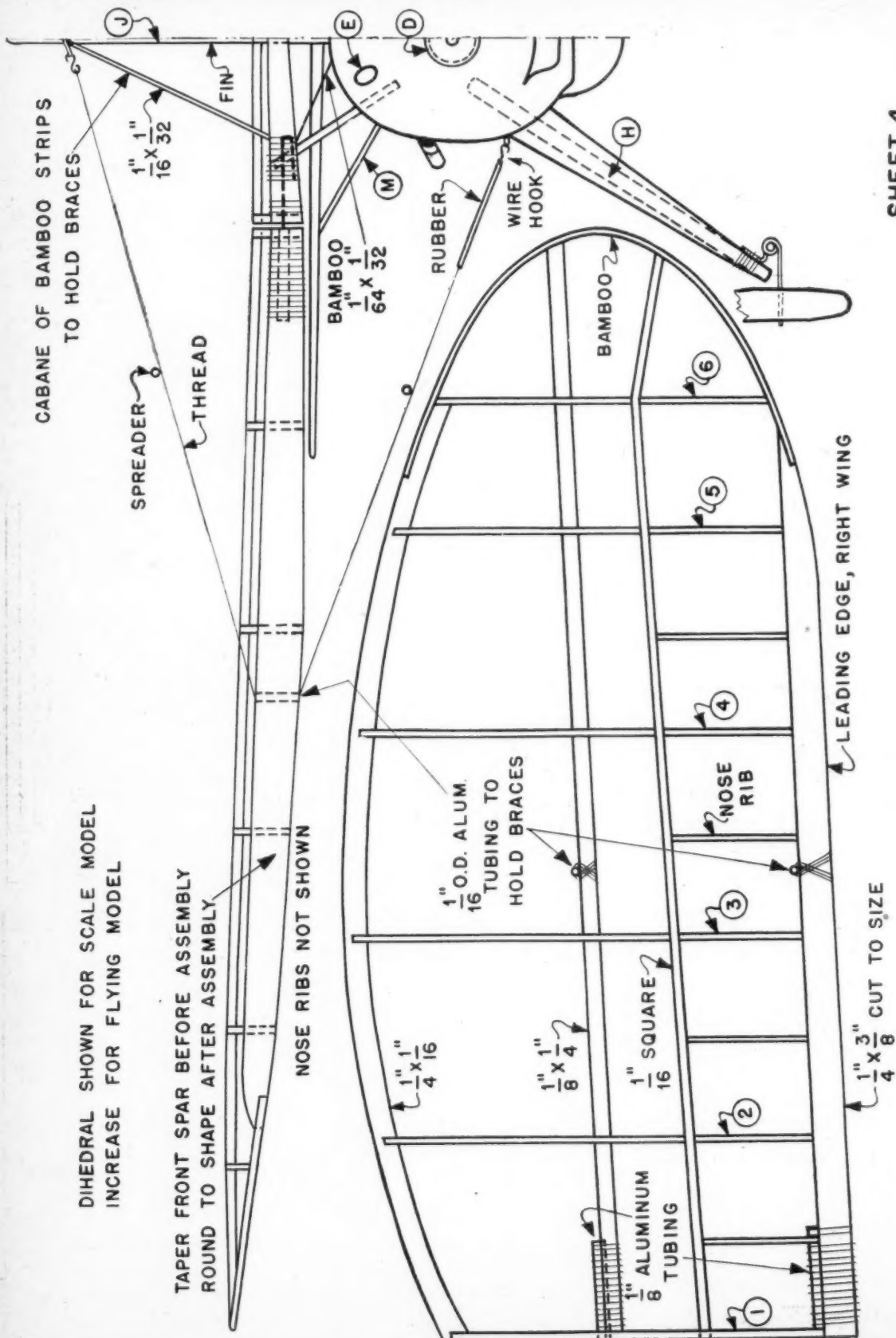
(Continued on page 42)



SHEET 1 FULL SIZE

SHEET 2
FULL SIZE



SHEET 4
FULL SIZE

The Aerodynamic Design of the Model Plane

Article No. 34

Chapter No. 4

IN PRECEDING articles we completely discussed the problem of storing energy in rubber bands of various qualities and sizes. Charts accompanied the explanations which showed the characteristics of various types of motors in respect to the energy that could be stored in them. However, the amount of energy that is put into a motor and the quality that it delivers when *unwinding* are two different things entirely. No power plant was ever developed that gave out as much energy as was put into it. The same principle applies to rubber motors. The torque delivered by the motor at any instant when unwinding, is less than the torque registered at any time while winding up the

A Comparison of the Energy Output of Dry Rubber Motors of Various Qualities and Strand Sizes

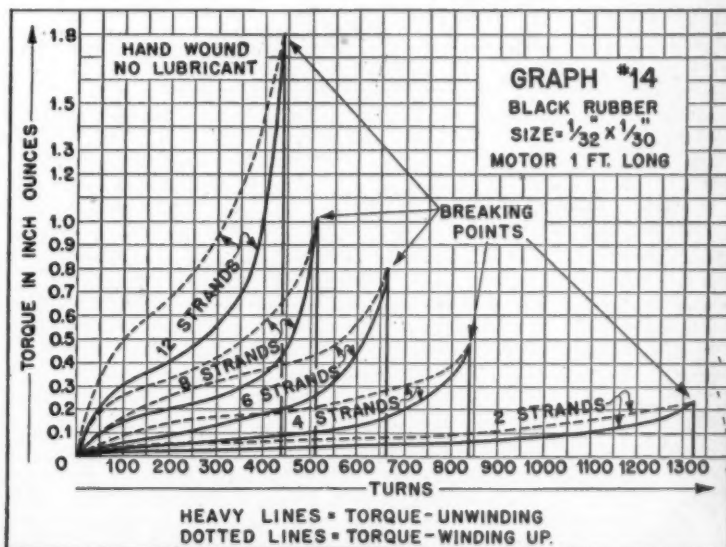
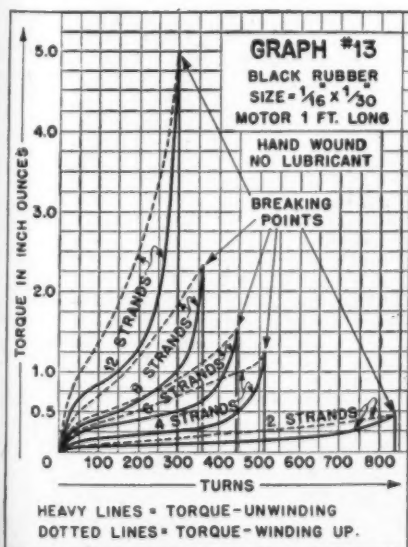
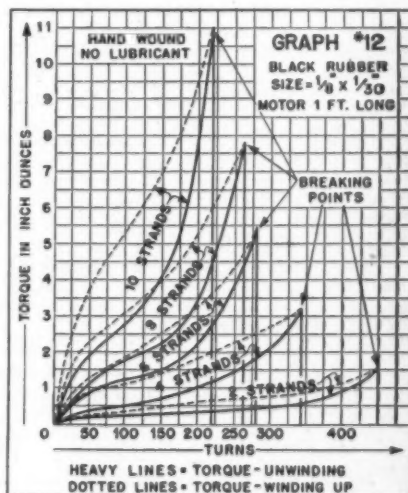
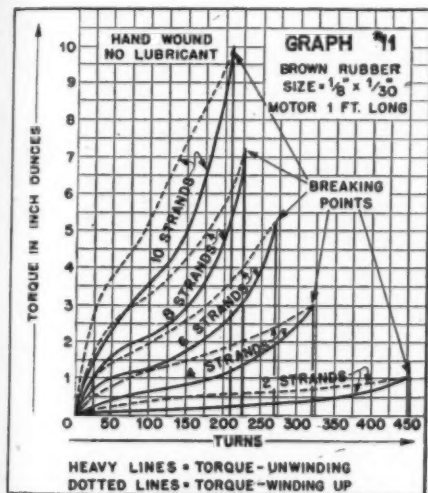
By CHARLES HAMPSON GRANT

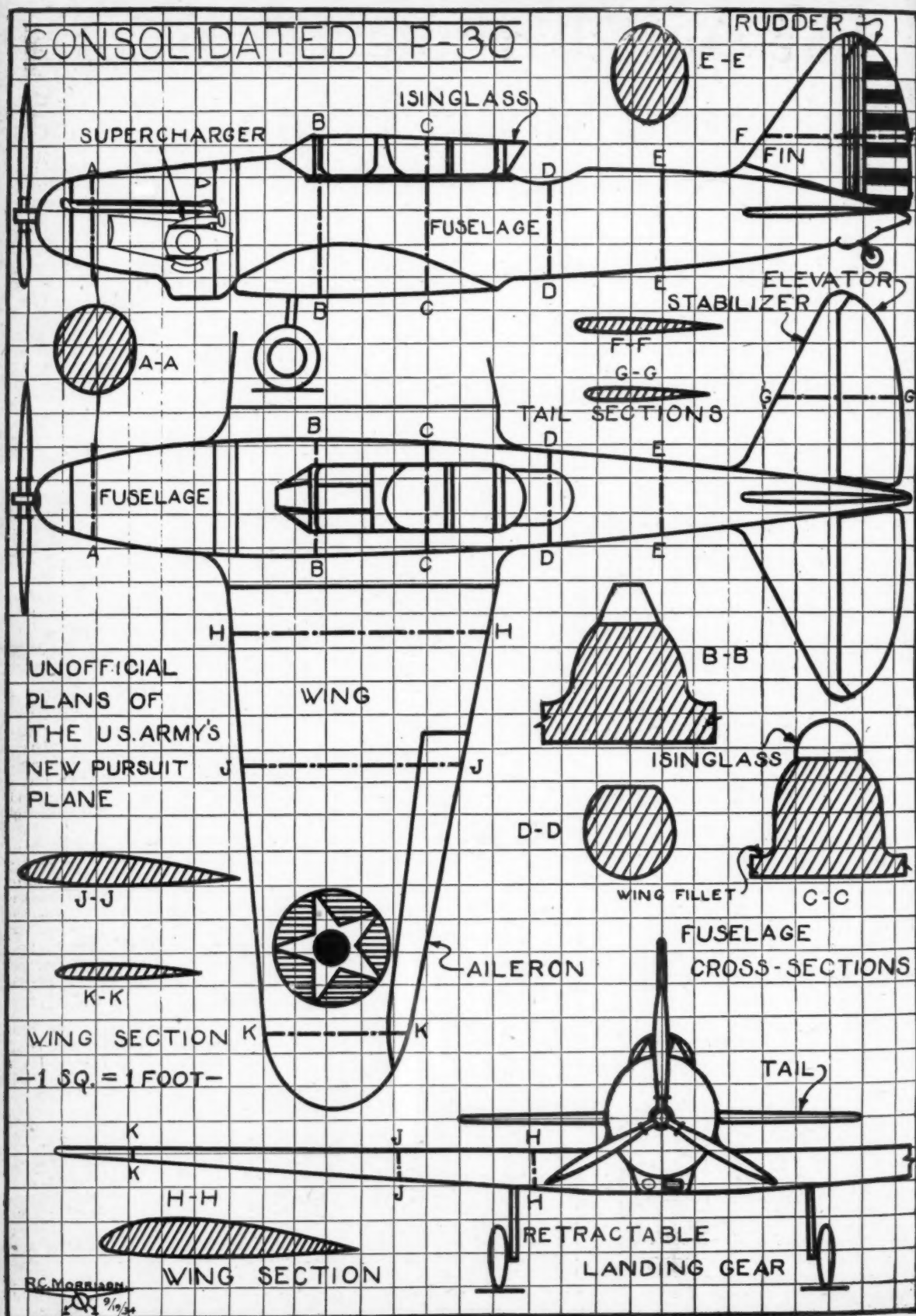
motor by approximately 35% to 50%.

The graphs on this page show the complete results of tests made with dry or unlubricated rubber of various quality and size. The dotted lines show the torque developed by the motor at any given number of turns while *winding up* the motor; while the heavy lines indicate the torque developed at any given number of turns

proximately. This formula was $W = \Pi QT$; where (W) represented the stored work, $\Pi = 3.1416$, (Q) the maximum torque and (T) the maximum number of turns that could be stored in the motor. However, as the work delivered by the motor is less than the work that can be stored in it, this formula does not hold true for work *delivered* by the motor. For *brown rubber*, the approximate formula should be $W = \Pi (QT) 0.77$. For *black rubber*, the approximate formula is $W = \Pi (QT) 0.7$. The formula given in the October issue of this magazine by means of which you can calculate the work from the number of squares under any

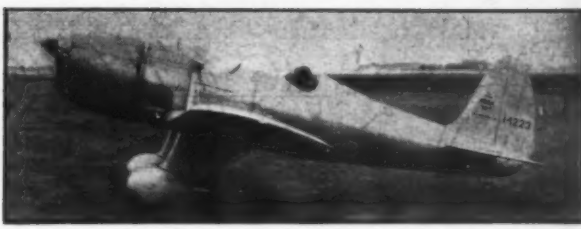
(Continued on page 32)







The latest Wedell-Williams. Note the unusual tail assembly



New Ryan S-T two-place "low-wing" sport plane. Speed 160 m.p.h.

On the Frontiers of Aviation

OUR biggest "scoop" for this month is the news that there is much activity at the airplane division of the Ford Motor Company. We have received word from many authoritative sources that the company, headed by Mr. William Stout, is secretly working on a new high-speed sport plane to sell for \$1,000.00.

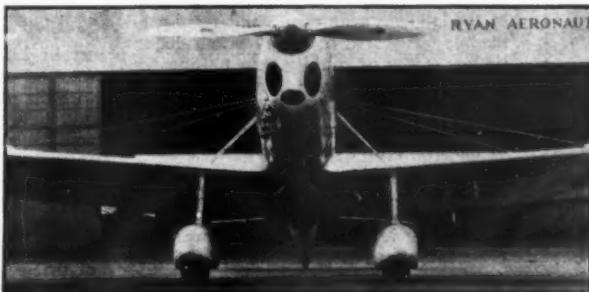
Though Mr. Stout derived his fame as the designer of the Ford tri-motor, most of his life's work has been in the developing of a light practical sport plane, his latest being the Stout Sky Car (1931). The Ford company ceased the production of the Ford tri-motor, frequently called the Tin Goose, several years ago, probably because of the great loss incurred in the development of new not-so-successful planes, such as their giant forty-passenger airliner and their bomber. The depression also played a big part.

In the last few years Mr. Stout has been developing a high speed train at his Stout Laboratories and now the news comes that he is producing a new light plane, probably a revamped version of the Sky Car, in conjunction with the Ford Motor Company which is also said to have built a powerful V-type engine to be used in the plane! There are rumors that the motor will sell for \$250.00! This low price will be attained by the mass production method. According to the Bureau of Air Commerce's wide-spread survey, there is a demand for 10,000 planes of this type. The planes are liable to become as numerous as Ford cars in the next few years.

Another astonishing fact is that the plane, which will be all-metal, is expected to have a 160 m.p.h. cruising speed! Aeronautical engineers may smile at this performance, but it is possible that such a high speed might be attained. Though Mr. Stout has had many radical ideas in regard to the designing of an airplane, most of them have proven to be sound and this latest venture may also prove to be

New Planes of Startling Performance— High Lights of Planes at the Cleveland Air Races — How to Build a Model of the Consolidated P-30

By ROBERT C. MORRISON



"Close up" of the nose of the new Ryan S-T. It is an all-metal job of unusual performance

as successful as his tri-motor design.

The Curtiss Aeroplane and Motor Company has produced a new high-wing Navy fighter which is probably their new XF13C1, powered by a 700 h.p. Wright Cyclone engine. The motor is said to be very silent. In recent tests the ship made a power dive and zoomed across the flying field at a speed of almost 400 m.p.h. It is said that there was very little noise, considering the speed at which the ship was flying.

The fifth of the new Northrop Executive sport planes has been sold in recent months. The plane, which is similar to the Delta, has a high speed of 220 m.p.h. and

cruises at 200 miles per hour.

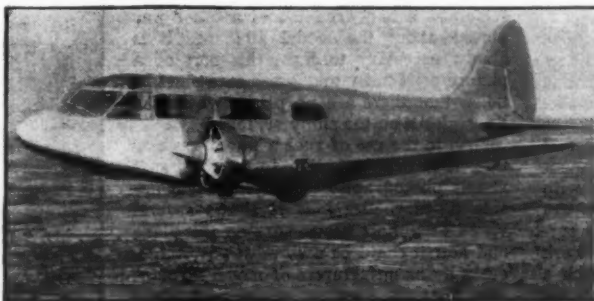
The National Air Races at Cleveland this year was reported to be a great financial success and the result has been that there is much talk about more trans-continental races and also a speed dash around America!

This writer was fortunate enough to attend this year's races and inspect the various new racing planes there. Benny Howard, famous race pilot and designer, flew me out to Cleveland from New York City in one of United Air Line's low-wing Boeings. An excellent free luncheon was served on board, and the trip was very enjoyable. There is no better way to travel than by air.

Benny Howard, because of his position with United, was unable to compete in the races, though three of his planes, "Pete," "Mike" and "Ike" did. Howard's new giant racer, "Mr. Mulligan," had a performance too good to be true, and Harold Neuman who was flying the ship cross-country, passed out at the controls. It seems that the plane was able to climb way up to 18,000 feet. The lack of air at that height rendered Harold Neuman unconscious and the ship at once headed for earth. Fortunately, Neuman regained consciousness before the ship hit ground and he piloted it to a safe landing. This occurrence forced "Mr. Mulligan" out of the Bendix race. The plane is an all-metal monoplane and it is said that there is room in it for four passengers.

Other planes that were scheduled to compete in the Vincent Bendix trans-continental Race, but were not thoroughly completed in time were the Kieth Rider, Wittman and Armstrong planes.

The Kieth Rider, which was to be flown by Jim Granger, is a low-wing plane similar in design to its smaller predecessors that competed in this year's races. The plane is expected to do over 400 m.p.h. and was expected to participate in the MacRobertson Race. Wing flaps and a retractable



The new British Airspeed Envoy, two motored transport. (Courtesy of "Flight")



An Open Forum for Readers, What They Think, Do and Say, Presented So That All Who Read May Enjoy and Benefit by an Exchange of Ideas

We cordially invite all our readers to make use of this department of the magazine to present their ideas, criticisms, arguments and commendations, on all phases of aviation. If you feel that any idea presented herein warrants commendation or criticism, write, telling what you think about it, so that by debate, "truth" may be determined. Address all letters to "SLIPSTREAMS."—The Editor.



IN THIS section of our magazine we are presenting the ideas which we feel may be helpful to our readers, or which may be interesting from a point of discussion regarding their accuracy. If you feel they are worth while or if you have found that they are not practical, or have difficulties either in construction or operation, we will welcome your comments. Perhaps you may have suggestions or improvements to offer. If so, write us and tell us what you think.



In our October issue we published an idea on "How to Obtain Automatic Lateral Stability on a Model Airplane," by Hing Lee. At that time we requested comments from our readers upon this subject.

Mr. Peter Walter Westburg has been kind enough to tell us what he thinks about it. He says:

Disagrees With Hing Lee

"I have not applied the device to any plane, but a thorough study of the article confirms me in the belief that it is impractical, in fact impossible, because it works on the same principle as blowing oneself along in a sailboat. An airplane cannot possibly pull itself back into position with cords or strings unless those cords are fastened or connected to the control surfaces. The idea would undoubtedly work if the threads were connected in such a way to the ailerons that they would move when the airplane lost its flying position and thus bring it back to a correct position.

"Perhaps I have misunderstood the article and if so please accept my apologies."

No, we do not think that Mr. Westburg has misunderstood the article. In fact, he has offered the best criticism and explanation of this device that has come to us. We quite agree with what he says. If the landing gear were fixed rigidly to the body, it would be more efficient due to its low center of gravity. In pulling the airplane back into normal flight position in this case, the pull of the landing gear would be transmitted through the body to the wing, thus pulling the wing down in this way rather than by means of a thread. The suggestion invites the builder to do a great deal of useless work to no practical end. If readers have any other comments about this idea, we will welcome them.



Next we have a very unusual and intriguing idea, sent to us by John S. Simmus, Junior. Here it is:

Something New in Model Photographs

"We invite you to look at picture Number One. No, it isn't a picture of a wrecked plane, nor is it three planes piled on top of each other. It is merely an illustration of what may be done with your camera and a little ingenuity on your part, in taking pictures of model planes.

"This particular photograph was taken of a model of one of the late navy pursuit planes, not with mirrors for they will cause a double image due to the thickness of the glass, but with chromium-plated sheets of metal. Shiny tin will serve as well and is more convenient to obtain. One piece a little larger than the plane was set up as a background and another was placed under the model airplane. It is almost necessary to light this sort of a picture artificially and great care must be taken that there are no places where the light glares on the shiny surfaces.

"As to the use of such a photograph as this, it is most valuable for study. Look at this photograph carefully. Turn it upside down, notice how it shows several views of almost every part on the plane and how it could be used most advantageously by manufacturers of model airplane kits. Besides sending plans with their kits, they could send a photograph such as this instead of several photographs

which would be far more expensive and perhaps not as effective as an arrangement such as this. Then, too, model builders who make pictures of their planes like this, could send them to their friends for study rather than for just a mere photograph of their model.

"The whole secret of getting a good picture of a model plane is in the angle of view, the lighting and the use of the correct kind of film. You model builders who have been having great difficulty with the red surfaces on your planes showing, have a great surprise in store for you. Next time you take pictures use either Eastman S. S. Panchromatic film or Agfa Superchrome. Either of these films will produce a light grey where ordinary color-blind film will produce a black when taking a plane painted red or some part of it of that color. For most artificial lighting, be careful of one thing; that is, throwing a light from the back of the plane or from the bottom as this makes the ribs show, and if the paper on the wings has been stained, it shows up in streaks making a very unpleasant effect.

"So get out your cameras before very long, take these few hints and surely you



Fig. No. 1

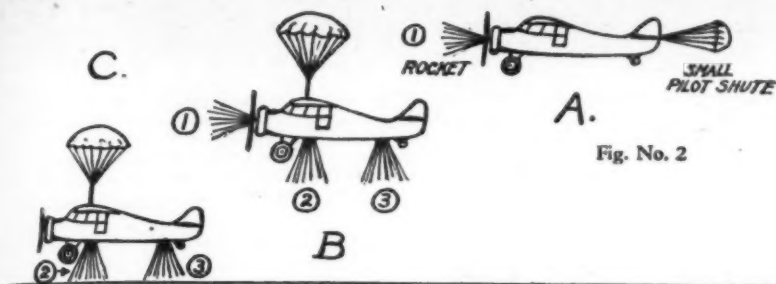


Fig. No. 2

will be far more pleased with your work when you get your pictures back from the finishers."

This suggestion should provide some interesting experiments for model photograph fans on days during which they are snowed in this winter. Perhaps some of you may have some criticisms or improvements concerning this idea.

Kenneth C. Ackerman tells us he has an idea which will improve our magazine. He says:

Do We Need Structural Design?

"During my experience I have met many model builders and after seeing many of their products, I have thought they needed knowledge of constructional problems. Some have used ridiculous truss systems and their bracing is far too heavy for their strength. I doubt if many of them could even explain why a biplane is stronger for its weight than the average monoplane. For their sake, I feel a series of articles on the principles of constructional design is necessary, and though I do not feel it absolutely necessary for myself, I feel that I could profit wonderfully from such articles.

"Aerodynamic design has been preached and preached, but not enough attention (in my opinion) has been devoted to constructional design. In articles by Howard McEntee, it stated to use certain size materials for certain size planes, but not enough space was devoted to adapting these sizes to the purposes of the planes. I feel that these articles were insufficient, and so I make this request.

"Please see what others think of the idea."

Possibly Mr. Ackerman likes to build planes rather than design them. Yes, we have "preached and preached" aerodynamic design for the simple reason that young men are more deficient in this branch of model work than in all the others put together. Many builders understand the construction of planes to various degrees, but some of them understand very little about aerodynamic design or the underlying principles involved in building a stable airplane.

We hope you will grant Mr. Ackerman's request and tell us what you think of this.

future possibilities. We would say that this is one that staggers the imagination. However, look it over and tell us what you think. Mr. Winstead describes it as follows:

Parachute and Rockets Used for Soft Landing

"Recently I sent in an idea concerning rockets as a safety device for an airplane. I thought of attaching a comparatively small parachute and adding two more rockets as per diagram Number 2. This method would not require a large chute and should set the plane down with comparatively little damage in case of accident, or if the pilot was unable to find the ground as in a fog, fig. B.

"The plan, briefly, is to have the chute tucked away in the tail. In an emergency the pilot turns on rocket (1) slowing down the plane, then releasing the chute which has its attachment to the plane on top, at the center of gravity. When the plane starts to descend vertically, rockets (2) and (3) are set into action and rocket (1) is cut off. Rockets (2) and (3) are automatically adjusted to keep the plane level. The chute is used as a directional guide more than as an aid to slower descent.

"I would appreciate any comment."

We believe that this certainly is a problem for some of our advanced aero-

nautical engineers, so we are calling upon them through this column to comment on this idea.

Edward Hathaway writes us and gives us a suggestion which may be of help. He says:

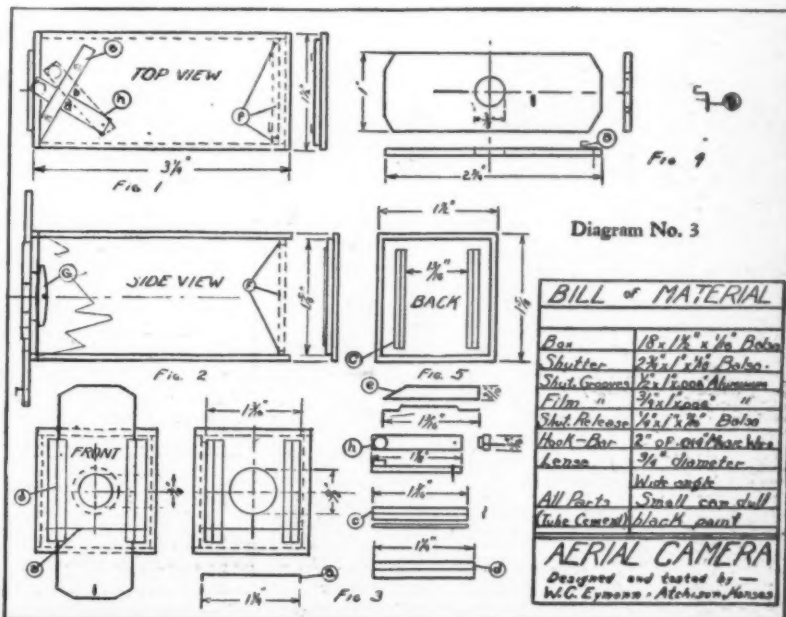
How to Move Cemented Parts

"To move cemented parts, soften the cement with steam until it is flexible and the part movable. Then bend to the angle desired.—Has anyone tried this?"

The Aerial Camera

For those who are interested both in photography and model flying, this little camera should prove very interesting. The completed camera costs the designer less than twenty-five cents. The cost is ridiculously low but when one considers its simple construction and few parts, it is easier to understand why the camera is so inexpensive to build. Just a word about the lens of the camera before you start construction. The author used the eye-piece out of a pair of ten cent binoculars purchased at the five and ten cent store. If these cannot be secured in your locality, any other short focal length, wide angle lens will do. However, before building the camera to the length indicated in the drawing, you must find if this is the correct

(Continued on page 40)



Here we have a very unusual idea by K. P. Winstead. Most of our inventions have originated from fantastic visions of

A New Deal for DEALERS

(see below)

Now A Real HAWK

We claim for this model the distinction of being the finest and most complete authentic flying model on the market today. Even exhibition models could not outclass this new beauty for external appearance—and she flies very well, too! Colored the usual yellow and olive-drab of the Army with the beautiful color marking of the Selfridge Field Squadron of its characteristic black and white; with black lettering and red striped top wing, along with the red, white and blue insignias, and the "super" authenticity, this model is taken out of the model-building class of hobby work into one of almost scientific precision duplicating. The model should make a 100% wind tunnel model. Every possible detail, wing ribs, stringers, etc., reproduced. Span 23 1/2", length 16 1/4", weight 4.9 oz. Complete Kit SF-21B.... **\$3.25**



HOWARD RACER "IKE"

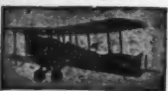
Information on this design is supplied both as the four or two wheel "Ike" and the two wheeled "Mike." Flies and climbs beautifully. Span 15 1/2", length 13 1/2", weight 1.5 oz. White with black details, lettering. Kit SF-42, only... **98c**



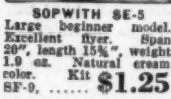
TRAVEL AIR MYSTERY
Completely redesigned. Span 23", length 15 1/2", weight 2.2 oz. Beautiful solid appearance. Red, black, yellow, green trim. Kit SF-2D.... **\$2.95**



SOPWITH SE-5
Large beginner model. Excellent flyer. Span 20", length 15 1/2", weight 1.9 oz. Natural cream color. Kit SF-9.... **\$1.25**



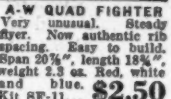
DH-4 BATTLEPLANE
Amazingly authentic. Span 31 1/2", length 23 1/2", weight 3.9 oz. Now olive drab with black and blue checkered nose and fin, white wheels. Kit SF-5.... **\$3.50**



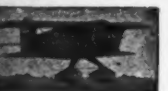
A-W QUAD FIGHTER
Very unusual. Steady flyer. Now authentic rib spacing. Easy to build. Span 20 1/2", length 18 1/2", weight 2.3 oz. Red, white and blue. Kit SF-11.... **\$2.50**



CURTISS JN-4D
The wartime trainer. Span 33 1/2", length 30 1/2", weight 2.7 oz. Now a beautiful yellow with brown trim and alleron decoration. Kit SF-4.... **\$3.25**



FOKKER TRIPLANE
Plane of Germany's greatest ace, Von Richthofen. Span 17 1/2", length 14 1/2", weight 2.3 oz. Now authentically colored silver nose, white rudder and markings. Kit SF-14B.... **\$2.50**



REDESIGNED LAIRD SUPER-SOLUTION
Our famous high-speed flyer. More authentic than ever. Span 15 1/2", length 13 1/2", weight 1.7 oz. Yellow and green. Kit SF-5B.... **\$2.50**



SOPWITH CAMEL
Span 20 1/2", length 14 1/2", weight 1 1/2 oz. Snap-on cream and brown fuselage, parts of wings and tail. Fuselage slides cream and brown checkered. Kit SF-10.... **\$2.50**



POLISH P-8 FIGHTER
A real beauty—with "filled-in" fuselage, etc. Span 25 1/2", length 17 1/2", weight 2.7 oz. All silver. Kit SF-6.... **\$2.95**



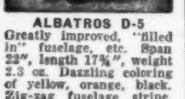
BISHOP'S NIEUPORT
Pride of Canada's war ace, who assisted in our redesigning work. Span 19 1/2", length 14", weight 1.8 oz. Silver and blue. Kit SF-12B.... **\$2.50**



CURTISS HELLDIVER
Data for both Executive or Fighter types. Authentic ribs, etc. Span 23 1/2", length 16 1/4", weight 2.7 oz. Blue and silver. Kit SF-7B.... **\$3.50**



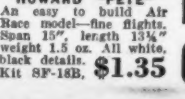
RICKENBACKER'S SPAD XIII
Very authentically redesigned. Span 19", length 15 1/2", weight 2.5 oz. Yellow, green, black details. Kit SF-13B.... **\$2.65**



ALBATROS D-5
Greatly improved, "filled in" fuselage, etc. Span 23", length 17 1/2", weight 2.3 oz. Dazzling coloring of yellow, orange, black. Zig-zag fuselage stripe. Kit SF-16.... **\$2.50**



BAYLE'S GEE-BEE
1931 Air Race sensation. Span 17 1/2", length 12", weight 2.1 oz. Yellow and black. Kit SF-17B.... **\$1.95**



HOWARD "PETEY"
An easy to build Air Race model—fine flights. Span 15", length 13 1/2", weight 1.5 oz. All white, black details. Kit SF-18B.... **\$1.35**



BOEING P12-E
One of the prettiest of all army fighters. An excellent flying model. Span 22 1/2", length 15 1/2", weight 3.3 oz. Colored yellow and olive drab, with beautiful red and yellow trimmings. Kit SF-3C.... **\$2.85**

Here's How To Select C-D's
There is a great deal of variation in opinion as to which model many should build, but the rule we give here is a pretty safe one to follow.

Models of the fourth or easiest class are: SF 8, 10, 11, 18D, 22B, 26, 32, 33, 36, 38, 40, 42; models of the third class are as follows: SF 6, 12B, 14B, 16, 34 and 44; models of the second hardest class are: SF 10, 4, 13B, 17B, 19, 20, 24, 28, 29, and 30; models of the first, or hardest class, are: SF 2D, 3, 21, 23, 25, 27, 31, 35, 37, 39, 41, 43, 45, 47, 48, 49 and 50. Although many beginners might build some first class models with a high degree of success, we do not recommend them.

Build all 3/4" C-D line of Thompson Trophy Winners:
'29 SF-2D... **\$2.85**
'30 SF-48... **2.50**
'31 SF-17B... **1.45**
'32 SF-27B... **2.50**
'33 SF-47... **2.95**
'34 SF-48... **2.95**

Complete Set, \$15.80
The "greatest" gift for Air Race Enthusiasts.

Every 3/4" C-D Kit Now Contains

1. Pilot block for carving, with instructions. 2. Coloring for pilots. 3. Coloring for propellers, whether metal or wood. 4. Block for all details. 5. Thread for all brasswires (mostly new silver grey). 6. Printed out wood, not a few pieces rubber stamped, but every necessary curved piece printed out clearly on the finest grade of balsa wood obtainable. 7. All strip wood necessary. 8. Sufficient dope for the model, cement for gluing it together and tissue cement for applying the paper and coating. 9. Complete material for scale propeller as well as that for flying propeller. 10. Authentic rib and stringer material supplied now in all Kits (many filled-in fuselage jobs, too). 11. And, of course, all necessary insignia, color for stringing with tape, special new shaped wood blocks, etc., etc., etc., where needed.

WAIT-CURTISS F11C-2 and TURKEY-HAWK FANS!

Until you see the C-D version of these designs before you buy any other make \$3.75 each. China Hawk fans will also be interested in seeing announcements on these ships which will appear in our winter catalog mailed by the end of November. Send 5c for catalog at once.



Authentic Highspeed U.S. Army yellow
Claimed fastest service bomber in world standard U. S. Army yellow, olive drab, duplicating an almost impossible to duplicate fillets beautifully (and easily) from Boeing 247. Turned Balsa invisible in the (time-proven efficient method of exhibition. If sold 5 or more years ago, Complete printed-out-wood (Glenn)...



REDESIGNED PRINTED
This giant has a span of 55" and a length of 30" with its two motors powerfully pulling the redesigned model has all curved wood printed authentic building and appearance than ever. The thoroughly engineered drawing of modeling information and over 16 oz. of the new giant Kits. We now offer a questionable-express charges, so we quote...



NAVY BOEING F4B-3 (or-4)
Beautiful flying miniature of the masterful fighter now used by the Navy. Exciting to build—thrilling to fly. Capable of fairly long flights. Span 22 1/2", length 18 1/2", weight 3.2 oz. Colored silver, blue, yellow and red. Kit SF-29.... **\$2.95**



U. S. NAVY CURTISS F9C-3
Easy to build—and beautiful flyer. Drawings include also full information for making original 1931 Akron Fighter. Span 19", length 14 1/2", weight 2.2 oz. Silver, blue, red, black details. Kit SF-22B.... **\$2.50**

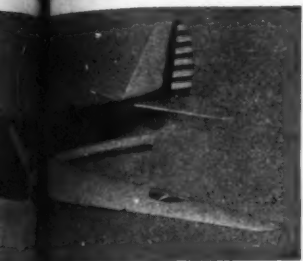
C-Ds should be seen to be fully appreciated, open daily 9 A.M. to 6 P.M. except Monday 5 P.M. Accessible from any point in Cleveland Catalog 5c.

World's CLEVELAND's ever offered—all with printed-out-wood—at only

25c to \$8.50

delivery at no extra charge. And we pay even on Kits SF-35 and 45. There are no charges of any kind. So be good and generous yourself—for Christmas comes but once a year. Be sure to show this great assortment to those who C-D Models Themselves

are wondering what you'd like for Christmas—tell 'em your choices. And why not also give C-D's to your modelbuilding friends, too. It will please them more than any other gift. BUT don't wait till the last minute. Order early, as it's going to be a C-D Christmas!



MARTIN BOMBER

length 33 1/2", weight 17 oz. Colored black. Novel and strong method of (not retractable). Complicated design ever before like it—even our (powering) model is ready for ex- command at least \$20.00. **\$8.50** post free.



WOOD BOEING 247

is nothing less than a wizard for flights, very gray colored and weighs 16 oz. The enormous quantity) with data for more "all-in" fuselage, balanced controls, (17" x 44"), each contains accurate detail, etc., contained within each one of our mailing service without the **\$8.50** shipped post free. Kit SF-35....



DOUGLAS O-38 OBSERVATION

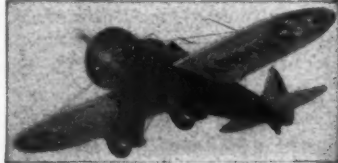
Very beautiful and unusually well de- model. Authentic only as "Cleve- land" makes 'em! Span 30", length 22 1/2", weight 4.8 oz. Yellow, olive drab, black detail. 2 pilot cockpits. **\$3.75** Kit SF-43....



VOUGHT CORSAIR V-65

Make either of the new 2-place Corsairs (V-65 or V-80). Super detailed, extremely realistic. Embodies new Cleveland fea- tures, including new principle gray flying wing blades. Span 27", length 19 1/2", weight 4.2 oz. Colored blue, yellow, red, black and silver. **\$3.75** Kit SF-41....

Make Store, West 57th St. and Bridge Ave., Monday 9 A.M. to 9 P.M. and Sunday 2 to 5 P.M. (on Madison line) or driving.



FAMOUS C-D BOEING P-26

Formerly the KP938. Very popular. Much imitated. The most modern pursuit model of a low wing design. Authentically de- tailed to the tiniest gadget. Span 21 1/4", length 17 1/4", weight 2.5 oz. Colored yellow and olive drab. **\$2.50** Kit SF-23. A Real Buy!.....



AERONA C-3

True in detail, beautiful in appearance, exciting in flights. Instantaneous model "hit"! Very easy for beginners. Span 27", length 15 1/4", weight 1.9 oz. Colored Red and silver. **\$2.65** Kit SF-40....



HIGH-SPEED FURY

British Hawker Interceptor fighter. Now re- signed and beautifully striped top wing and fuselage, lettering under wings, etc. Long, fast flights. Span 23 1/2", length 19 1/4", weight 2.6 oz. All silver. **\$2.65** Kit SF-30B....

READ BEFORE ORDERING

We have absolutely no connection with any other manufacturers so send all your orders to the address below. Canadians and all foreign customers add just 15% to every order. Special Delivery service \$24 extra per Kit. C.O.D.'s 25% cash order, accepted only when a dollar is remitted to assure acceptance.

"C-D DWARFS"—25c to 85c

Cleveland's new Dwarf line of 1/4" scale models announced by popular demand made us for C-D quality, lower priced, smaller kits. Each kit entirely complete as are all C-D models except "Dwarfs" DO NOT contain CEMENTS OR DOPES. They are exactly 2/3 the size of the 1/2" scale SF models, so take descriptions given using the same design number, but the prefix, instead of being SF is D, and use 2/3 the given sizes. D-10 65c, D-6C 65c, D-10 65c, D-20B 45c, D-23 65c, D-24 85c, D-26 35c, D-27 50c, D-29 65c, D-33 30c, D-37 75c, D-40 80c, D-42 25c, D-43 85c. 10c extra for postage on each kit must be included. Watch your dealer's stock for additional numbers. Absolutely nothing else ever like them. Remember—NO LIQUIDS.

DEALERS!

Since so many of your responsible dealers and wholesalers have been willing to buy from us for the accommodation of your customers, C-D kits at the full list price, and since so many ask if some special agency could not be allowed, many of you having had petitions signed by up to 200 boys for our establishing you as special representatives in addition to the many other propositions which have been offered us, we have reconsidered our dealer plan and re-established it. We now offer you the full Cleveland line and feel sure that you will find C-D kits and supplies turn over quickly as we have found them in dealing direct. Wire or write immediately (responsible established dealers only) for complete details of the "New Deal for Dealers". Liberal discounts allowed. Rush service. Hurry in order to cash in on this Christmas business before the orders are sent in to us. The new low priced Dwarf line mentioned above is especially attractive—only 25c to 85c! Think of that, for authentic C-D scale models! Already going like a house afire. LIBERAL DISCOUNTS.



WEDELL- WILLIAMS

Yes, this is the '33 Cup Winner which Jimmy Wedell himself flew to victory. This model is a VERY beautiful version of this design with its numerous fuselage stringers authentically duplicated, authentic rib spacing just as on the new Hawk, and practically all the new C-D designs, it employs a "full" motor and an actual N.A.C.A. cowling (easily made) enabling you to see the opening behind the motor. Colored red with its characteristic black scalloping and bronze motor crankcase and color separations. The model weighs 2.9 oz. and has a span of 19 1/4" and a length of 16 1/4". It is capable of excellent speed flights. Entirely complete with all printed-out wood. Hundreds of parts. Send for complete **\$2.95** Kit SF-47.....



Great Lakes Sport Trainer

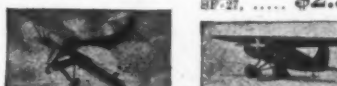
One of the prettiest models available. Far easier to build than our older No. SF-1B and SF-1F. Excellent flights. Includes Cleveland's latest features and loads of details. Span 20", length 15 1/4", weight 2.1 oz. Orange and cream **\$2.65** Kit SF-1G....



WACO U-2 Very popular cabin plane. Span 24 1/2", length 19 1/4", weight 3.7 oz. Silver and red. **\$3.25** Kit SF-37....



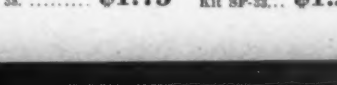
CURTISS A-8 ATTACK Superdetailed. Extremely realistic. A real performer. Span 33", length 24 1/2", weight 4.7 oz. Colored yellow and olive drab. **\$3.25** Kit SF-25....



BERLINER-JOYCE Graceful - appearing 3- place fighter. Excellent flights. Span 25 1/2", length 21", weight 3.9 oz. Yellow and olive drab. **\$3.50** Kit SF-39....



LOCKHEED VEGA A picture for beauty—a wonder for flights. Span 30 1/2", length 21", weight 3.7 oz. Colored brilliant red & cream. **\$3.25** Kit SF-24....



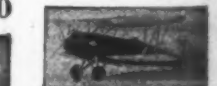
COMPER SWIFT Redesignated. Excellent flights. Span 18", length 13 1/2", weight 1.4 oz. Beautiful green, with black fuselage design. **\$1.25** Kit SF-35....



FOKKER D-8 Claimed most efficient German World War fighter. Span 20 1/2", length 14 1/4", weight 2.0 oz. Cream and blue. **\$2.50** Kit SF-34....



HEATH PARASOL Span 28 1/2", length 12 1/2", weight 0.8 oz. Mostly orange, decorative black fuselage side panel. Excellent for beginners, and a "duration" flyer **98c** data. Kit SF-26....



BOEING B5 MAIL Easy for beginners. Re- designed for beauty and even greater duration than ever before. Span 33 1/2", length 24 1/2", weight 3.5 oz. Blue and silver. **\$2.50** Kit SF-32....



NIEUPORT 28 Called most beautiful World War model and it certainly is. A beauty for flights, too. Span 20 1/2", length 16 1/4", weight 2.1 oz. All silver. **\$2.50** Kit SF-30....



CAPT. PAGE'S RACER High speed model. Span 23 1/2", length 17 1/2", weight 3.5 oz. Silver with red, white and blue insignia. **\$2.65** Kit SF-44....



LINCOLN SPORT A lightplane sensation. Beginner's model. Span 15", length 12 1/4", weight 1 oz. Cream, black trim. **98c** Kit SF-36....


12 WEST 57 STREET, CLEVELAND, OHIO

NATIONAL AERONAUTIC ASSOCIATION JUNIOR MEMBERSHIP NEWS



Prepared by—National Aeronautic Association, Washington, D. C.

New Chapters


 **BELOIT**, Wisconsin, has a charter from the Association for a chapter of junior members. The club holds weekly meetings in the Beloit Y.M.C.A., at which a regular program of activities is carried out. This includes a business meeting, discussion, speaker and work period during which the members work on models. A gasoline powered model is the club's present project. Club Advisor is Conrad W. Hansen. William Bates, Eddie Howard and Alfred Heim are officers.

ST. JOSEPH, Missouri, a city that has long been very air minded, has just organized a model airplane club under the N.A.A. and has been granted a junior charter. The St. Joseph club is sponsored by Mr. Harry Block who is an active senior member and official of the Association. The club has as its advisor, Mr. G. R. Huffman. He may be addressed at 6206 Washington Street and will be glad to receive applications for membership from those in the vicinity who are interested. Weekly meetings are held in the basement of the Church of the Brethren, which affords excellent space for the club's activities.

SEATTLE, Washington, N.A.A. Junior Chapter, has just been granted a charter. This club is sponsored by Dr. Frank Barsley, a busy surgeon and practising physician, who devotes as much time to the club as he can spare. Ralph D. Carpenter is club president and lives at 1411 West 56th Street. Henry Paylor, 426 E. Aurora Street, is secretary and treasurer.

All three of these new chapters plan to hold frequent contests and exhibitions for their members. They are under good leadership and it will be interesting to note their progress and hear of their activities.

September Records

 **FOUR** new model plane flight records were established during September, at the indoor meet held by the N.A.A. in the large dirigible hangar at Lakehurst, New Jersey. This meet was made possible through the courtesy of the Navy Department in Washington and the hearty co-operation of the personnel of the Naval Air Station at Lakehurst. Commander C. E. Rosendahl, U.S.N., who commands the station, was an interested spectator, as also were hundreds of visitors who came to see the station.

The meet was held on Saturday, Sep-

tember 15th and was attended by more than thirty. No prizes were offered, the only incentive being an opportunity to fly models in the huge hangar with the chance of making some new records.

Three of the records were in the Open age class, being established by Michael Lichstein of Philadelphia. His records are: Class A Stick Model, R.O.G., (Baby R.O.G.) 8m 40s; Class B Stick Model, R.O.G., 11m 06s; and Class B Stick Model, Hand-launched, 14m 45.8s. The fourth record was made by a thirteen year old junior, Raymond Steinbacher, Ridgefield, N. J., when his autogiro model flew 57.2 seconds. After his official flights, just to show that it could be done, Steinbacher flew his autogiro without its fixed wing and made some excellent flights. The events and winners follow:

Class A Stick Model (Baby R.O.G.)

1st—Hyman Olick, Philadelphia, 9m 44s; 2nd—Michael Lichstein, Philadelphia, 8m 40s; 3rd—Ernest Walen, Springfield, Mass., 8m 37.4s.


Class B Stick Model, R.O.G., 1st—Michael Lichstein, 11m 06s; 2nd—Jesse Jessen, Philadelphia, 10m 15s.

Class B Stick Model, Hand-launched, 1st—Michael Lichstein, 14m 45.8s; 2nd—Jesse Jessen, 13m 17s; 3rd—David Hecht, New York City, 11m 50s.

Class C Stick Model, Hand-launched, 1st—Mayhew Webster, Philadelphia, 18m 22.6s; 2nd—Alton H. DuFlon, Jr., Ridgefield, N. J., 15m 08.4s; 3rd—Lawrence Smithline, New York City, 14m 56.2s.

THE N.A.A. held another indoor meet in the Lakehurst Hangar on October 20, this date being after this issue went to press. Consequently it is impossible to give the results here.

News From the Chapters

 **BOSTON'S** N.A.A. Junior Chapter, the Jordan Marsh-Boston Traveler Junior Aviation League, has an interesting and busy program outlined for the coming year. This organization has always been fortunate in being able to attract notable speakers to its Saturday meetings with the result that the members have benefited to a marked degree. Captain Willis C. Brown, the club director, has kept the club active in contest work during the past summer. The point system for the summer's contests shows that Phillips is way out in front with 4254 points; Marchi is second with 1488; Capo is third with 935. The winners for the

season have regularly been awarded the handsome prize of a trip to the National Championship Meet.

The club's weekly newspaper, **WING OVERS**, is the oldest weekly model airplane newspaper in the world. It is a mimeographed publication that is produced by J. A. L. members.

PHILADELPHIA Model Aeroplane Association has started the yearly program by holding an outdoor meet on October 6 and indoor meets are planned for each fortnight thereafter during the winter. Percy Pierce and Victor R. Fritz are the gentlemen who are most active in this club's leadership. It is quite evident that the Philadelphia builders and flyers know their model aerodynamics. Just look at the table of records and note the number of Philadelphia names.

BAMBERGER Aero Club, Newark, New Jersey, N.A.A. Chapter, held an outdoor glider meet on Saturday, September 29, at Newark Airport. The results were not of sufficient duration to qualify as new records due to the unfavorable weather conditions. The meet was attended by about fifty contestants who braved the unpleasant weather. John Romanowski, Jersey City, was awarded the Jack O'Meara Trophy for half a year as a result of his consistent showing in the meet.

This club in sponsoring the first meet for gasoline powered models exclusively, has undoubtedly set an example for other sponsors. The first event of this sort was scheduled for October 27 at Caldwell-Wright Airport, Caldwell, N. J. The gas model has come into its own now and presents quite a problem at a rubber powered meet. Therefore, it may eventually come to pass that the gas model contests will generally be held separately.

VENTURA, California, has a model plane club that is made up of N.A.A. junior members. Cleve C. Webber, 1069 Poli Street is the one to contact for information about joining this fine unit. Mr. Lewis Clark is club sponsor and great things are expected from the club during the current season.

AKRON, Ohio, N.A.A. Junior Chapter, in a recent meeting, outlined a program for the season that includes contests, lectures, and other interesting activities that are sure to be of lasting benefit to all the club's numerous members. Mr. H. M. Jellison, a member of the N.A.A. Model

OFFICIAL MODEL AIRPLANE RECORDS

Approved by Contest Committee of the N.A.A.

Through October 10, 1934

INDOORS

STICK MODEL AIRPLANES, Hand-launched

CLASS B

Junior: Raymond Steinbacher.....Ridgefield, New Jersey.....9m 07s
Senior: Ralph Kummer.....St. Louis, Missouri.....17m 49.8s
Open: Michael Lichstein.....Philadelphia, Pa.....14m 45.8s

CLASS C

Junior: John Stokes.....Huntingdon Valley, Pa.....18m 53.4s
Senior: Mayhew Webster.....Philadelphia, Pa.....19m 56s
Open: Carl Goldberg.....Madison, Wisconsin.....22m 59.4s

STICK MODEL AIRPLANES, R.O.G.

CLASS A

Junior: Joseph Pruss.....Philadelphia, Pa.....10m 25s
Senior: William Latour.....Philadelphia, Pa.....10m 17.6s
Open: Michael Lichstein.....Philadelphia, Pa.....8m 40s

CLASS B

Junior: Louis Shumsky.....Atlantic City, New Jersey.....9m 15.2s
Senior: William Latour.....Philadelphia, Pa.....12m 46s
Open: Michael Lichstein.....Philadelphia, Pa.....11m 06s

STICK MODEL AIRPLANES, R.O.W.

CLASS A

Junior: James Shilver.....Philadelphia, Pa.....3m 41.8s
Senior: Paul Karnow.....Philadelphia, Pa.....5m 01.4s

CLASS B

Junior: James Mooney.....Philadelphia, Pa.....8m 37.6s
Senior: Mayhew Webster.....Philadelphia, Pa.....11m 55s

GLIDERS, Hand-launched

CLASS A

Junior: Hewitt Phillips.....Belmont, Mass.....21.6s
Senior: David B. Hecht.....New York City.....34.4s

CLASS B

Junior: Stanley Congdon.....Glen Ridge, New Jersey.....15s
Senior: David B. Hecht.....New York City.....31.6s

CLASS C

Junior: Stanley Congdon.....Glen Ridge, New Jersey.....17s

AUTOGIROS

Junior: Raymond Steinbacher.....Ridgefield, N. J.....57.2s
Senior: Alton H. DuFlon, Jr.....Ridgefield, N. J.....2m 01.2s

FUSELAGE MODELS, R.O.G.

CLASS B

Junior: Theodore Golomb.....Philadelphia, Pa.....6m 26s
Senior: Herbert Greenberg.....Newark, New Jersey.....12m 23.5s

CLASS C

Junior: Hyman Oslick.....Philadelphia, Pa.....12m 59.4s
Senior: Emmanuel Enderlein.....Philadelphia, Pa.....13m 24s
Open: Jesse Bieberman.....Philadelphia, Pa.....6m 31.2s

FUSELAGE MODELS, R.O.W.

CLASS B

Junior: John Stokes.....Huntingdon Valley, Pa.....3m 23s
Senior: William Latour.....Philadelphia, Pa.....2m 43.6s

OUTDOORS

STICK MODEL AIRPLANES, Hand-launched

CLASS C

Junior: Bruno D'Angelo.....Philadelphia, Pa.....8m 29.4s
Senior: Vernon Boehle.....Indianapolis, Ind.....15m 00s
Open: Bernard Collins.....Providence, R. I.....3m 23s

CLASS D

Junior: Fred Skafec.....Akron, Ohio.....8m 21.6s
Senior: Ralph Kummer.....St. Louis, Missouri.....20m 54s
Open: Frank Zalc.....New York City.....1m 27s

GLIDERS, Tow-launched

CLASS C

Senior: Bob File.....Columbus, Ohio.....23m 13s

CLASS D

Junior: Stanley Congdon.....Glen Ridge, New Jersey.....45.2s
Senior: Fred Korn.....New York City.....1m 16.2s

AUTOGIROS

Senior: Ralph Kummer.....St. Louis, Missouri.....2m 06s

FUSELAGE MODELS, R.O.G.

CLASS C

Junior: Donald Mertens.....Erie, Pennsylvania.....1m 44s
Senior: Russell Yungbluth.....St. Louis, Missouri.....11m 35s
Open: Bernard Collins.....Providence, R. I.....2m 56s

CLASS D

Senior: Vernon Boehle.....Indianapolis, Ind.....8m 43s
Open: Michael Lichstein.....Philadelphia, Pa.....1m 28s

CLASS E (Gasoline Engine)

Senior: Maxwell Bassett.....Philadelphia, Pa.....21m 57s
Open: Carl V. Carlson.....Chicago, Illinois.....6m 48.5s

Plane Committee, is directly in charge of instruction and contest work of the Akron group, one of the most active in the country. Akron model plane enthusiasts are fortunate in having such an interested senior group behind them as the Akron Women's N.A.A. Chapter. It is this senior chapter that had so much to do with the National Championship Meet being held in Akron last June, making it the outstanding success that it proved to be.

Several of the Akron members scored high in the model plane meet that was held in Cleveland as a part of the National Air Races during Labor Day weekend.

SPRINGFIELD Model Airplane Club, Springfield, Mass., under the energetic leadership of Ernest Walen, is doing a great deal to keep up interest among its members. In fact, the club has representatives at nearly all of the model airplane contests in the East. This group has a number of older members who attend the club meetings just to see the work of the younger element, but many of the older members are the most active builders and flyers. It is doubtful if there is a more active N.A.A. worker among the junior members in all the country than Mr. Walen. His business takes him on extended trips and he is always in the thick of model plane conferences, assisting the Association's work in every way possible.

NATIONAL AERONAUTIC ASSOCIATION OF U. S. A.

DUPONT CIRCLE
WASHINGTON, D. C.

I hereby make application for membership in the National Aeronautic Association as a Junior Member. I am under twenty-one years of age.

I enclose fifty cents for initiation fee and first annual dues (Use check or money order.)

Name

Street

City

Date of Birth

Approved

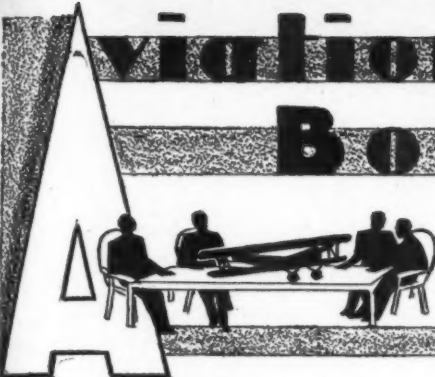
(Parent sign here, if applicant is under eighteen)

(Please print or type)

State

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Aviation Advisory Board



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CHARLES HAMPSON GRANT
Chairman of the Board

Formerly of
The Technical Section, Air Service, U. S. Army

A NUMBER of our readers have recently become interested in building large gliders. For the benefit of those who may want to participate in this branch of aviation, we will answer several questions sent in by George Cressman of Court and Lafayette Streets, Doylestown, Pa. Here are his questions:

Question: What is the proper wing loading for a hang glider?

Answer: A wing loading of one to one and one-half pounds per square foot will give good results.

Question: What is a good aspect ratio for a biplane hang glider?

Answer: An aspect ratio of six is approximately correct. However, a ratio as low as five and one half may be used.

Question: Are there any restrictions against flying a home-made glider in Pennsylvania?

Answer: A home-made glider may not be flown on a public airport unless licensed by the Department of Commerce. However, such a machine may be used on private property.

Next we have several questions sent to us by Edward W. Stabler of 202 East Gay Street, West Chester, Pa. (Incidentally, this young man should do well in the airplane business. He could call his planes "Stabler" Airplanes). Here they are:

Question: Does sweepback add to the

longitudinal stability of a model airplane or is it just ornamental?

Answer: It is certainly not for ornamental purposes. It does not aid in the longitudinal stability of an airplane unless there is a washout in both wings; that is, the angle of incidence of each wing decreases progressively from the center of the wing to the tips. Usually the sweepback is used to give lateral stability in place of a dihedral, or when used in conjunction with a dihedral it aids in the effectiveness of the dihedral angle.

Question: Does the use of rubber lubricant give a motor more power or is it merely for longer life?

Answer: The rubber lubricant does not give the motor more power. In fact, the torque is slightly reduced by the use of a lubricant. However, twice as many turns may be put on the motor when lubricant is used; thus, a greater amount of work may be stored in the rubber strands. The rubber lubricant usually shortens the life of a rubber motor.

Question: What sort of prop is best for an endurance model, a hand-carved one, a machine-cut prop or one made in three pieces containing hub and blades?

Answer: Of the three props manufactured in the three different ways mentioned, the hand-carved prop is usually best. However, a prop is not efficient necessarily because of its method of manu-

facture, but rather because of its shape and general design. Two propellers may be made identically the same, one carved by hand and one by machine, yet one will be just as efficient as the other. Usually a propeller made in three pieces containing the hub and blades is the least efficient of any propeller because this method of manufacture necessitates usually that the propeller be of the straight pitch type instead of the helical type.

Question: What sort of plane is best for flight stability; a two-winged ship or a monoplane?

Answer: We assume that Stabler means a biplane when he refers to a "two-winged ship." Of the two cases there is absolutely no difference in stability unless the biplane wings are arranged so that they are staggered and have decalage. "Decalage" is an arrangement of surfaces of a staggered biplane in which the top wing is at a greater angle of incidence than the lower wing.

Some may doubt the answer of this question. However, let us say that a biplane may be made more stable than any particular monoplane; or a monoplane more stable than any particular biplane simply by changes in design. In answering this question, we are assuming that the two ships are similar in all respects of design.

(Continued on page 44)

Here you see a ship that gives the private owner military plane performance. It is the fastest cabin job in the United States, the custom built Beechcraft, Model A17F. It has a top speed of 235 miles per hour and cruises at 212. It is powered with a supercharged Wright Cyclone engine, developing 690 horsepower.

The plane has many unusual features of construction. One of them is a sort of aerial shock absorber, a system designed by Beech, which irons out the bumps and vibration and lessens the fatigue incident to boring through the sky at more than 3½ miles a minute.

Air brakes or wing flaps, are provided to cut down the landing speed. When these flaps are cranked down, they lower the landing speed to about 60 miles per hour. Other standard equipment includes an ice warning indicator, electrically operated parachute flares, a beacon receiver and a direct electric starter.

A Hamilton Standard controllable pitch propeller is installed and the plane rockets skyward at 3,000 feet per minute to a service ceiling of 32,000 feet. The normal cruising range is 750 miles. Four passengers are carried. The total useful load is 2,200 pounds.

The landing gear is semi-retractable, the wheels being drawn up into the pants during flight. The plane has a somewhat unusual appearance due to the inverse wing stagger, or the location of the top wing behind the lower wing. The wing bracing is of the single strut type. The safety glass windshield gives the pilot exceptionally fine visibility and is shaped to improve the streamlining.

The manufacturer is the Beech Aircraft Company, Wichita, Kansas.



Air Ways Here and There

(Continued from page 13)

double tails. This allows the exhaust rocket to act without interfering with any part of the ship, possibly burning it up. From what we can see, Mr. Roberts has used the head of a sky rocket to produce the driving force. One should be able to carry out some interesting experiments with this type of ship.

Picture No. 7 might be easily mistaken for a shot of a squadron of Hawker Furies in flight. However, it is merely a group of models built by Ray Grout of 10941—89th Avenue, Edmonton, Alberta, Canada, which are hanging in his workshop. The background is merely a picture on the wall of the shop. The models are made to one-half inch scale and took about one year to complete. They are solid, non-flying models.

In picture No. 8 can be seen a very beautiful model of a Boeing 247, built by J. G. Wheeler of 966 Bank Street, Victoria, B. C., Canada. This ship took first prize at an exhibit in a motor show held in Victoria. He says this model was built from a kit of one of our advertisers. This speaks seemingly well for the model company who supplied the kit, and for Mr. Wheeler who completed the ship.

Last May the course in model building entitled, "Fundamentals of Model Airplane Building," was started in this magazine. It has been running every month since that time. The purpose of this presentation was to provide instructions in model building for the less fortunate younger boys who have not become experienced in this art. There are many young fellows who would like to build models, but who are not capable of constructing the complicated machines on sale. The models presented in this course began with the simplest form of glider and have advanced progressively in regard to difficult operations as the course has proceeded.

One of the young men who has been tremendously helped by this course is William Satel of 2295 Morris Avenue, New York City. He has been building models for only six months, yet how successful he has been through the application of this course may be seen from picture No. 9, which shows the model presented in the September issue in full flight. Picture No. 10 shows a "still" of the little plane. We recommend that model builders who are starting their model aviation career follow this course closely. If they do, it should not be long before they become expert builders.

Elbert J. Weathers of 2720 Poinsettia Drive, San Diego, California, sends us picture No. 11 of his flying scale Foché-Wulf cabin job. It is an exceedingly well-built ship. However, he says its flying qualities are not to be "bragged" about inasmuch as it is built to perfect scale and its tail surfaces are comparatively small.

However, he sends us picture No. 12 of his speed racer which demonstrates his ability to build models which fly exceedingly well. This is an unusual action "shot" and one which is most difficult to obtain. Some of you would-be photog-

raphers can appreciate the difficulties involved in taking a picture of this kind when the model is traveling at high speed.

MODEL NEWS FROM OTHER COUNTRIES

One of the most active British model builders is Mr. C. Finlayson of 4 Haymarket Terrace, Edinburgh, Scotland. Picture No. 13 shows a twenty-four inch Comper Swift in full flight, which was built by Mr. Finlayson. This is an excellent flight picture and very difficult to get. The little ship was built from factory blueprints. It weighs two and one-half ounces and has an endurance, hand-wound, of approximately twenty seconds. Mr. Finlayson realizes that this is not exceptional, but like many model builders with super-scientific minds, he is interested in the quality of the performance while it is in the air, rather than the duration; for, after all, duration depends chiefly upon lightness, while quality of performance is a product of a thorough understanding of factors. These latter are very difficult to comprehend without long and arduous experiment. The former, that is, lightness of construction, is a comparatively easy matter to produce. We thank Mr. Finlayson for his kind contribution.

This is not the only contribution from a Mr. Finlayson. It appears that the Finlayson family is pretty well scattered throughout the world; for, we have received a contribution from a Mr. W. J. Finlayson of 1 Goe Street, Wellington E. 2., New Zealand. It is indeed peculiar that two persons with the same name, both in remote points on the globe, should send contributions to our magazine. Mr. W. J. Finlayson favors us with picture No. 14 of a nine foot gasoline model airplane, built by Colin Philpott. This model weighs ten pounds. The engine was built by Captain Bolt. It develops 2/3 h.p.

The builders of this ship recently had a rather interesting experience. The model was being flown at Wellington Air Drome and was making a circular flight, retained by a cord, when suddenly the cord broke and the model flew free over crowded houses. Finally the fuel ran out after a six minute flight. The ship was at an altitude of 300 feet when this occurred. Going into a glide, it finally landed on a roof of a house.

The idea of flying a gasoline model on a string is a unique and unusual one. We can imagine that it might be similar in effect to wrestling with a wild bronco at the end of a lasso. However, this idea provides suitable material for future experiment among gasoline powered model builders. We will be extremely interested in hearing more from Mr. W. J. Finlayson about gasoline models.

FRANCE

France is becoming more air-minded in a model way as each day passes. The popularity of this activity has increased tremendously there lately. Picture No. 15 shows one of the competitors in a recent contest held at Vincennes, France. We understand that one of the active sponsors of this contest was the Escadre de La Rose des Vents.

CLUB NEWS

Atlantic City Model Airplane Club

We are indebted for news of the activity of this club to Jimmy Throckmorton of 121 North Congress Avenue, Atlantic City, New Jersey. It seems that Jimmy is one of a group of very enthusiastic model builders in Atlantic City which includes John Ginnetti, George Aspiotus, Merrell Malley, and Louis Shumsky. Picture No. 16 shows Louis Shumsky and his gas job.

Bamberger Aero Club

One of the important events that recently took place in the east was the Bamberger Aero Club Model Builders Convention and Luncheon, particularly the Luncheon. It seems that the smell of food is always a great attraction for energetic model builders and acts as excellent bait for a large attendance at meetings, conventions, contests, etc. However, we do not wish to infer that this was necessary in the case of the Bamberger Convention, for they have always proved most interesting, and this one certainly upheld that reputation. Many prominent model builders and those interested in model building attended. It was held on September 8th on the tenth floor of the Bamberger Building, Newark, New Jersey, and was conducted by Mr. Nathan Polk, director of the Club.

Besides thirty "crack" model builders of the East, the following guests were also present:

Lieutenant H. W. Alden, Chairman of the Junior N. A. A.; Casey Jones, famous flyer; Victor Fritz, Field Director of the P. M. A. A.; John Carisi, Lawrence Shaw, John Hulstrunk of the Newark Board of Education; Irwin S. Polk, former Director of the Bamberger Aero Club and Leonard Skolnick of the Newark Public Schools.

The purpose of the convention was to discuss problems which have arisen in model airplane activities; in the fields of organization, rules for contests, design and construction of models.

Picture No. 17 shows Fred Buckinburg with his gasoline model plane, which he is showing to Casey Jones and Lt. Alden of the Junior N. A. A.

By the time that model enthusiasts are reading this column, the first contest held exclusively for gasoline powered models will have taken place on October 27th, at the Caldwell-Wright Airport in Caldwell, New Jersey. If prophecies are correct, thirty models will have been entered. Any boy over fifteen years of age could enter and fly a model. The contest was made possible by the co-operation of Mr. LeMan, manager of the Caldwell Airport. His co-operation was a great help in stimulating this activity.

CORRESPONDENTS

The following young men would like other UNIVERSAL MODEL AIRPLANE NEWS readers to correspond with them:

Albert Zier, 308 Perry Street, Vermillion, Ohio.

Claude C. Arrasmith, 1637 Pike Avenue, Birmingham, Alabama.

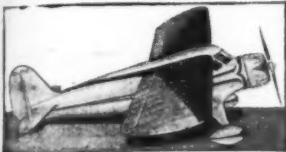
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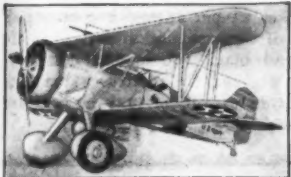
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Wingspan 32 5/16", length 21 1/4", weight 3 1/2 oz., exact 1/2" scale. Here's a plane you'll be mighty proud to own and fly. An exact reproduction of one of the latest 4 passenger cabin planes. You'll find more unusual and different features in this plane than in any other. For example—adjustable speed arrester built into the wings, the movable cabin doors, the complete interior with four seats and control column, and all the other Super-Detail features. Colored in bright contrasting yellow and black.

Kit complete \$2.50



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Wingspan 23 3/4", length 16 1/4", weight 3 3/4 oz., exact 1/2" scale. You've heard of this beautiful Curtiss Goshawk. Now you can build your own with the most complete kit you ever saw. This snappy little Navy fighter has many more details than you can see in the photo. Everything designed in exact scale of course. Streamlined drag ring, specially designed; two detachable blade propellers, and the entire model coated with the new IDEAL high lustre finish, with silver, yellow, red and black coloring. Plenty of material is furnished.

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BOEING P-26A

Wingspan 21 1/4", length 10", weight 2 1/2 oz. Exact 1/2" scale. One of the newest, most advanced of all fighting planes. Fast, speedy, with full armament capable of over 240 miles per hour. This flying model is an exact replica of the famous fighter—one that is identical in all but size with its noteworthy big brother. Beautifully colored in olive drab and yellow. All Super-Detail parts included.

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WHAT THE SUPER-DETAIL KIT INCLUDES:

Everything necessary to build a big, beautiful workmanlike job is included in the Super-Detail Kit. Finest materials only are used in its construction: Sheets of selected plainly printed balsa, strips of various sizes, etc., sheets of silk tissues, cement, both colored and plain dope, propeller shafts, two propellers, motor plate, rubber motor, wheels, cable cord and all other hooks, pulleys, control hinges, eyelets, washers, sand paper, celluloid, red, wire and other small but necessary things to make the complete model exactly in accordance with the plans and instructions.

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New Super-Detail Martin Bomber

Exact 1/2" Scale
Wing span 34 1/2", length 22 1/4", weight 4 1/2 oz. This famous big, powerful mystery ship of the Army now comes to you in exact 1/2" scale, a beautifully designed olive drab and yellow IDEAL Super-Detail Model. Has more new and beautiful features than any model Super-Detail features, the MARTIN BOMBER has retractable landing gear, rotating gun turret, movable machine guns, special streamline cowling, two types of 3 bladed propellers—one for flying and one for exhibition; with removable motor stick for flying; Rudder and elevator balanced surfaces. New type fuselage all in all one of the finest flying models ever built. Order yours today with the coupon. KIT COMPLETE. \$3.50

First to be approved—found to be almost 100% perfect in every detail—the famous IDEAL Stinson Reliant. This big beautiful flying model came away with the honors—and that's the way every IDEAL Super-Detail model is built, to come out on top.

No wonder IDEAL models take the lead. They are 100% scale—laid out by experienced flying men—men who have spent their lives designing and building real planes. That's why IDEAL Kits are accurate, complete, perfect, exact in every

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Whether you build the New Martin bomber shown above, the Stinson Reliant, the Curtiss Goshawk or the Boeing, you get the same high quality workmanship, the same accuracy in detail and 100% scale reproduction with every construction feature of the original duplicated and in the exact proportion, so that the finished plane not only flies beautifully, but it gives you a strikingly handsome, precise and perfect flying model.

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Boeing P-26A ☐ \$1.75

Stinson Reliant Bomber ☐ \$3.50

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State.....

TORQUE FATIGUE TEST TABLE

SHOWING CHANGE IN TORQUE WITH REPEATED WINDINGS
MOTOR-8 STRANDS OF $\frac{1}{8} \times \frac{1}{30}$ DRY BROWN RUBBERTORQUE SHOWN IN INCH OUNCES DEVELOPED
WHILE MOTOR IS UNWINDING

TIMES WOUND	NUMBER OF TURNS				INCREASE IN MOTOR LENGTH
	50	100	150	200	
1	1.6	2.15	3.2	6.0	
2	1.5	2.0	3.0	5.8	
3	1.4	1.85	2.8	5.6	7%
4	1.3	1.8	2.75	5.4	
5	1.25	1.7	2.7	5.3	
6	1.2	1.65	2.65	5.2	8.2%

The Aerodynamic Design of the
Model Plane

(Continued from page 19)

particular curve, is true for winding or unwinding torque curves, whichever you wish to apply it to. It is as follows:

$$W=2\pi H \left(\frac{N}{-} \right); \text{ where (W) equals the}$$

work represented by the area under any particular curve; (H) equals the number of turns represented by one square of the graph, measured horizontally; (N) equals the total number of squares within the area bounded by the torque curve, the base line and the vertical line extending downward from the breaking point shown on the graph; (V) equals the number of squares, measured vertically, required to

make one inch ounce of torque. For instance, in graph No. 1, $V=2$. In graph No. 7, $V=4$.

One of the burning questions in model builders' minds is whether brown or black rubber is superior for motive power in model planes. In past instalments of this series of articles, it has been indicated that more energy can be stored in black rubber than in brown rubber, in practically every case. However, from the graphs it can be seen that generally black rubber loses more of its power when unwinding than does the brown rubber. This greater loss occurs in every case of motors with various numbers of strands, except when two strands are used. Here the black rubber does not lose so much power when

TORQUE FATIGUE TEST TABLE

SHOWING CHANGE IN TORQUE WITH REPEATED WINDINGS
MOTOR-8 STRANDS OF $\frac{1}{8} \times \frac{1}{30}$ DRY BLACK RUBBERTORQUE SHOWN IN INCH OUNCES DEVELOPED
WHILE MOTOR IS UNWINDING

TIMES WOUND	NUMBER OF TURNS				INCREASE IN MOTOR LENGTH
	50	100	150	200	
1	1.2	1.7	2.3	5.0	
2	1.1	1.6	2.2	4.6	
3	1.1	1.6	2.1	4.5	5%
4	1.0	1.5	2.1	4.4	
5	1.0	1.5	2.1	4.3	
6	1.0	1.5	2.1	4.2	6%

unwinding, as the brown variety loses.

In considering the torque developed by the two qualities of rubber, the graphs show that brown rubber develops greater torque for any given number of turns. The torque developed during the flight is stronger and steadier. However, the value of this is overcome by the higher maximum torque and the greater number of turns possible when a motor is composed of black rubber.

Black rubber also has the advantage of lighter weight per foot. By counting the number of squares under the curves for brown and black rubber and comparing the total number, the relative value of the two qualities of rubber may be compared

(Continued on page 34)

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No dummy motor needed when this cowl is used. Has a hole for thrust bearing in the nose.

1 1/2" diam.19
2 1/2" diam.27
3" diam.30
3 1/2" diam.21

DOWELS
Straight-grained genuine birch dowels in the following sizes:

1/8" long....6 for .05
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3/8" long....3 for .05
3/8" diam.
3/8" long....2 for .05

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1/8 O. D. Brass for light indoor models. Per doz. 2c
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Strong, light, stiff. Sizes:
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DUMMY RADIAL ENGINES
Celluloid, 9 cyl. 3" diam.
Each35
1 1/2" diam.20
2" diam.30

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3/16 outside dia. ft.... .11
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2" diam.21
2 1/2" diam.26
3" diam.29

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24" Flying Model Travel Air "Texaco" 13"25c
Bellanca Pacemaker Flying Scale Model 14"15c
Lockheed Vega Winnie Mae Flying Scale Model 17"15c
Cabin Tractor10c
Twin Pusher10c
Puss Moth De Havilland Flying Scale Model 12"10c
R. O. G. 3 drawing consisting of R. O. G. Endurance Tractor and high performance R.O.G. printed on one sheet. 10c

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This is real nitrate dope thinned down to meet the requirements of model airplane usage.

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Absolutely the lightest covering material known to be had anywhere at any price. Use it for covering your endurance models.

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Newest thing for covering models.

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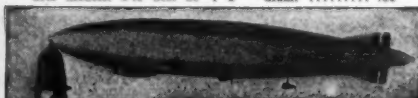
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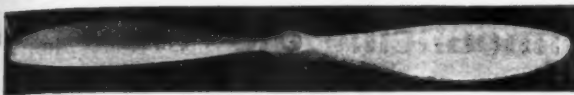
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1/2x1/8 6 for .14	2x5x4085
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1/2x1/32 6 for .16	
1/2x1/64 6 for .17	
1/2x1/128 6 for .20	
1/2x1/256 2 for .12	

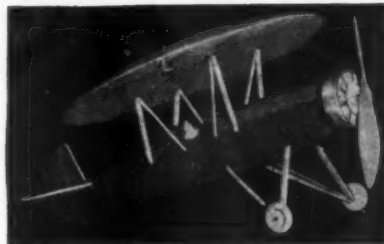
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1/32x2 2 for .03x	1/2x1/2 5 for .05
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1/8x2 2 for .06	1/2x1/8 3 for .06
3/16x2 2 for .08	1/2x1/16 3 for .07
1/4x2 2 for .10	1/2x1/32 3 for .08
1/2x2 2 for .12	1/2x1/64 2 for .09
3/4x2 2 for .14	1/2x1/128 2 for .11
1x2 2 for .16	1/2x1/256 2 for .12
1 1/2x2 2 for .18	1/2x1/512 2 for .13
2x2 2 for .20	1/2x1/1024 2 for .15
2 1/2x2 2 for .22	1/2x1/2048 2 for .17

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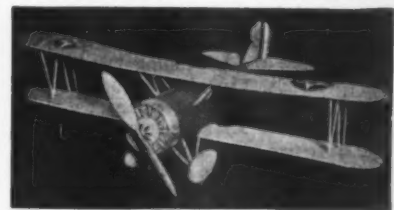
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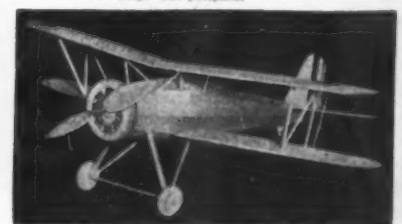
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(Continued from page 32)

in regard to the amount of work that can be stored in each.

Under the curve (heavy line) for eight strands in graph No. 11, there are about forty-seven squares. Under the curve for an eight strand motor in graph No. 12 for black rubber, there are fifty-two squares. Thus, in this case more work can be stored in the motor of black rubber. The values of a motor composed of various numbers of strands and qualities of rubber may be compared in like manner. For instance, let us compare the work delivered by brown and black rubber motors of ten strands. In graph No. 11, for brown rubber there are approximately sixty-six squares under the torque curve (heavy line) for ten strands. In graph No. 12 for black rubber, there are about sixty-two squares below the unwinding torque curve for ten strands. Thus, brown rubber shows up to slightly better advantage.

In the case of six strand motors there are about forty-two squares under the unwinding torque curve for black rubber, and thirty-nine squares under the brown rubber torque curve. Black rubber has the advantage in this case. Upon examination of the curves for four and two strand motors, you will see that black rubber is superior in these cases also. Thus, it would seem that it is better to use brown rubber only in instances where ten or more strands are to be used in the motor. This of course refers to motors on which a lubricant is not used. Unwinding torque curves for lubricated motors will be discussed in our next issue. This discussion deals with unlubricated motors only.

The effect of the size of the strands on the torque, maximum turns and the work that can be stored in a motor, has been discussed in foregoing articles, using the winding up torque curve as a basis of comparison. These comparisons hold true for the unwinding torque curves as well, for the percentage drop in the torque when unwinding, is approximately the same for all cases where the same quality of rubber is used.

It is well to note one important fact as follows: with any given cross section area of rubber in a motor, the less the torque will be for any given number of turns, but the greater the possible number of turns will be. In other words, a motor of four strands of 1/8x1/30 will give more torque for any given number of turns than a motor of eight 1/16x1/30 strands, which has equal cross section area. However, more turns can be stored in the motor made up of the finer strands.

Another interesting fact shown by the graphs, is that square rubber gives more torque and fewer turns than flat strip rubber, where motor cross section areas are the same. These facts may be used to advantage by builders to create any power condition desired, without changing the weight of rubber used. Briefly, with any given amount of rubber, use fine strands of flat rubber for less climb and longer duration. For more climb and less duration, use larger size strands or square strands of the same cross section area.

It appears that the actual amount of work that can be stored in a motor is not

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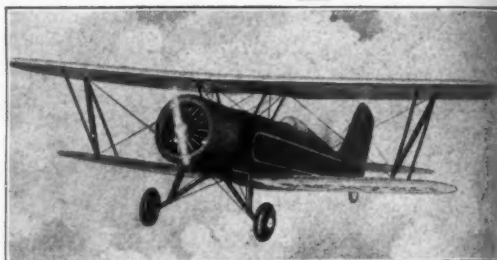
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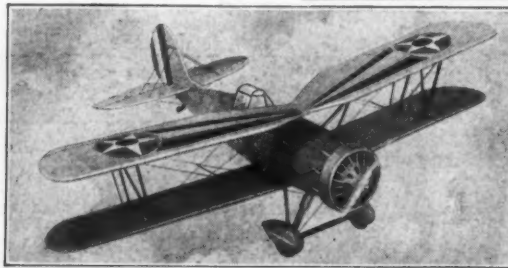
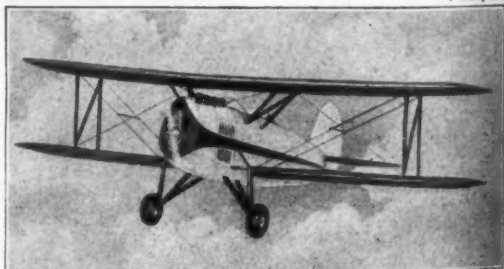
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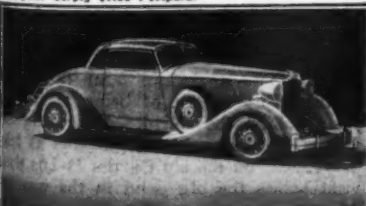
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effected by the size of the strands. If the cross section area of the motors is the same in two cases but the size of the strands different, you will be able to store the same amount of work approximately in each of the two motors.

In actual figures, the torque decreases about 8% and the possible number of turns increases about 8% when the size of the separate strands are reduced by one-half, the cross section area remaining the same.

The increase in the torque and decrease in the possible number of turns shown in graph No. 14 over corresponding motors shown in No. 13, is not due to the reduction in the size of the strands as one might deduce from statements in last month's article, but to the fact that in graph No. 14 the values of square rubber are shown, while graph No. 13 indicates values for strip or flat rubber. The increase in torque and decrease in possible turns in any motor is approximately 8% when square rubber is used instead of strip rubber of equal strand cross section area, the same number of strands being used in both cases.

All of the values for torque, turns and work indicated by all of the graphs are for motors when they are wound for the first time. Those who have had even slight experience with rubber band motors know that after repeated windings, the power of the motor grows less with each successive winding, and that the number of turns the motor will safely stand becomes greater. The most obvious physical change in the motor is its increase in length. It stretches more and more every time it is wound up.

These facts are important, for in order to be assured of sufficient power in a motor, it is necessary to know how great these changes are. The Torque Fatigue Test tables given here show how the torque changes with repeated windings in the case of 1/8x1/30 brown rubber and black rubber of the same size when the motors are wound to any given number of turns.

In both tables there is a decided decrease in the torque with each successive unwinding of the rubber. When the motor has been wound six times, the sixth unwinding shows a torque decrease of 15% to 25% in the case of brown rubber, the greatest decrease in torque taking place during the last half of the unwinding of the motor. At 200 turns, the torque dropped 15% after six windings and at 50 turns the torque had dropped 25% from the value of the torque at 50 turns on the first unwinding. The motor length increased 7% after three windings and 8.2% after six windings.

In the case of 1/8x1/30 black rubber motors of eight strands, the torque had dropped about 17% at any given number of turns after six windings. The per cent of torque drop at 50 turns was the same as at 200 turns. The drop at 50 turns and consequently the average decrease in torque is much less than in the case of brown rubber.

The tables show that the actual value of the torque for any given number of turns is about 18% greater for brown rubber than for black. However, the black rubber will absorb a greater number of turns

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HIGH SPEED and FORMIDABLE—characteristics of the big ship—Note the engine exhaust stacks—underwing radiator—fully enclosed wheel pants—four aerial bombs suspended beneath wings "ready for the enemy"—red, white and blue wing stars and tail stripes. Army insignia, etc. Done in colors and completely finished. FULL 18" wing span. \$2.00 Postpaid.

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by about 18%. This is probably due to the fact that black rubber is about 18% to 20% lighter than brown rubber.

The increase in length of the black rubber motors was 5% after three windings and 6% after six windings. Comparison of the two tables will show greater fatigue for dry brown rubber after repeated windings than for dry black rubber.

Next month unwinding torque tables for lubricated unstretched rubber will be given. Until then, keep your rubber away from light and air if you want to prolong its life.

Here Come the British (Continued from page 8)

The leading types among these general purpose craft are the Hawker Hart, Bristol 120, Vickers Vincent and Westland Wallace. All four are new types, replacing the Fairey III F, Westland Wapities and Fairey Flycatchers that have been used for this purpose. And all of them have a family resemblance; same old single-bay, slightly staggered biplanes so common throughout the British service, with N struts and a dihedral on the lower wing. The new model Hart is rated at 190 m.p.h. with a climb of 10,000 in eight minutes. There has been a lot of hush-hush about the Vincent and Wallace ships but they are believed to be slightly faster.

Just how many of them there are in service nobody quite knows, for they are usually listed by the duty they happen to be performing at the moment. Probably a good many of the 32 squadrons of "day bombers" as well as most of the 23 squadrons are of this type. In other words, they form the backbone of the service.

There has been a tendency toward specialization among certain types, also. The naval arm of the R. A. F. uses a number of Vickers Vildebeests as carrier torpedo planes. The Vildebeest is pretty much the same kettle of fish as the rest of the general-purpose machines, slightly slower on account of her heavy fittings for carrying the largest size of torpedo.

Finally, there are about 12 squadrons of night bombers, and here the British claim they are right on top of the world, with the Handley-Page mosters, which ever since World War days have been able to walk off with staggering loads. They look like a flying express train and rumble along at a snappy 150 miles an hour, but the endurance they have is something wonderful, enabling them to make a flight from London to Rome or Warsaw and back with the whole weight of 8,500 pounds of bombs. They are four-motored giants with one noteworthy feature of design—the armament. Two machine-guns are placed in the nose and another pair in a special turret right in the tip of the tail, behind the control surfaces.

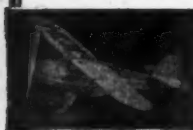
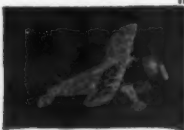
Just recently the Air Ministry has begun the experiment with another night bomber type; the Blackburn-Duncannon monoplane, on which as on most R. A. F. service types, there is a huge official silence as to performance. In appearance, it is pretty much a copy of the Boeing bombers used by the U. S. Army, with this difference—that the landing-gear is non-retractable. Only a single "wing," half a squadron of these ships, has been placed in production. The English loudly maintain that the value of the monoplane for military purposes is still something to be proved.

Which brings up another point, and one of the most striking. While the rest of the world is building high-performance monoplanes for bombers, pursuit and attack, the English stick solidly to the biplane; there isn't a retractable landing gear in their whole air service; there isn't a biplane without the lift and drift wires that the rest of the world discarded ten years ago; they still don't believe there is anything in the variable-pitch drop, and they imagine streamlining is a new-fangled notion. The only trace of originality is the fact that about a dozen autogiros have been added as staff machines.

How, then, do they manage to get so much speed out of their small ships; so much endurance out of their heavy bombers. Two things; one is light construction, but the other and more important is the fact that the English, although pretty close to the world's worst plane builders, are pretty close to the world's best motor designers. With the Rolls-Royce, Hawker and Armstrong-Siddeley motors they mount in the R. A. F., you could make a kitchen table fly. The British flyer always has the comfortable knowledge that he has power in reserve, and the very fact that the machines are old-fashioned, becomes an advantage. Those biplane designs are practically vibration-proof.

Remains to be noticed the flying-boat service of the naval air arm, about 200 planes. Here again we meet the usual British characteristic of being about ten years behind the world. Most English flying boats are still recognizable as improvements on the old Curtiss H-16s that went across the big pond in the war to do such yeoman service on submarine patrol. But once more you have to understand the British idea to know just why this is so. Most of the world's flying

(Continued on page 45)

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1 1/4" dia. 10c ea.
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1" dia. 20c pr.
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Bal. Tired Col.
Disc Wheel
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1" dia. 33c pr.
3/4" dia. 35c pr.

Aluminum Disc Rubber
Tired Air Wheels
1" dia. 10c pr.
1 1/4" dia. 20c pr.
1 1/2" dia. 25c pr.

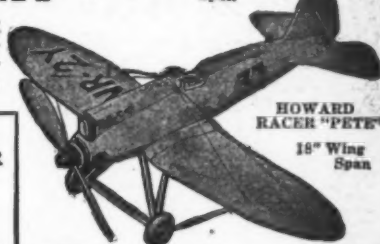
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Black lacquered
base for scale
models from
10" to 34" wing
span at 75c

PROPELLERS

2-Bladed	3-Bladed	2-Bladed	3-Bladed
3 1/2" 25c	4" 35c	1 1/2" 10c	1 1/2" 10c
4" 30c	4 1/4" 45c	1 3/4" 15c	1 3/4" 15c
4 1/2" 35c	4 1/2" 50c	2" 20c	2" 20c
5" 40c	5" 55c	2 1/4" 25c	2 1/4" 25c
5 1/2" 45c	5 1/2" 60c	2 1/2" 30c	2 1/2" 30c
6" 50c	6" 65c	3" 35c	3" 35c
6 1/2" 55c	6 1/2" 70c	3 1/4" 40c	3 1/4" 40c
7" 60c	7" 75c	3 1/2" 45c	3 1/2" 45c
7 1/2" 65c	7 1/2" 80c	4" 50c	4" 50c
8" 70c	8" 85c	4 1/4" 55c	4 1/4" 55c
8 1/2" 75c	8 1/2" 90c	4 1/2" 60c	4 1/2" 60c
9" 80c	9" 95c	5" 65c	5" 65c
9 1/2" 85c	9 1/2" 1.00	5 1/4" 70c	5 1/4" 70c
10" 90c	10" 1.05	5 1/2" 75c	5 1/2" 75c
10 1/2" 95c	10 1/2" 1.10	6" 80c	6" 80c
11" 1.00	11" 1.15	6 1/4" 85c	6 1/4" 85c
		6 1/2" 90c	6 1/2" 90c

Props. can be had up to 24 in. dia. Postage 5c each.

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Take-Up Long Plain End
1/2" 25c
3/4" 30c
1" 35c
1 1/4" 40c
1 1/2" 45c

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1/2" 10c each
3/4" 10c each
1" 10c each

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New Detailed Cast Motors
1" dia., 9 cyl. 30c
1 1/2" dia., 9 cyl. 50c
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1 1/4" long B 25c
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GUNS C
2" Double
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GUNS D
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1 1/2" long 5c

TYPE E
1 1/4" long 10c

TYPE F
1 1/4" long 15c

DUMMY
RATCHET GUN
3/4" long 10c
POSTAGE

BOWLS—Spun Aluminum

Dia.	Drag Ring	Open Face	Closed Face
1 1/2"	15c	15c	15c
1 3/4"	15c	15c	15c
2"	20c	20c	20c
2 1/4"	20c	20c	20c
2 1/2"	20c	20c	20c
Postage	6c		

Die Cast

Bombs and
TORPEDOES
12/16" 5c
1 1/2" 10c
3" Torpedo 15c
3c EACH

PICTURES

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of
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The Albatros Fighters on Parade (Continued from page 9)

was placed well forward, about 4 inches from the leading edge, while the rear spar was located approximately 2 feet, four inches, from the trailing edge. These were as usual of rectangular section and bound in fabric, beveled off on top at their extremities. Twenty-five speed type ribs built up of slotted-out webs and rather narrow flanges were placed approximately sixteen and a half inches apart except where the interplane struts were attached, at which points the ribs were displaced by a tubular steel compression member.

Between the leading edge and the front spar, the upper surface of the plane was stiffened by a false rib between each of the ribs proper. The Teves & Braun radiator again found its most practical setting exposed to the air-stream in the right half of the mid-wing section. The lower wing, slightly shorter than the upper was built up in halves which were attached in the familiarly modern method to abutments built out from the body to fillet flush with the planes at those sections.

Eleven ribs placed approximately 14" apart were employed to form each of the lower wing halves.

Ailerons which were hinged on auxiliary spars and connected vertically by a streamlined wood-encased steel strut were attached on each side of both planes which were closely scalloped at the trailing edges. Practically the same N type cabane struts used in the D-5a were employed in the D-7. The interplane struts however, were of the Dr-1 forms. Only one pair of these were used to support the wings on each side of the D-7, characteristic of the British S.E.5.

A generous supply of circular section stranded cables finished up to brace and support the wing structure on both sides. The span of the upper wing was about 30' and that of the lower wing, approximately 29'4". The chord of both planes was approximately 5'9", with a gap of about 5'7". The tail assembly presented in the D-7 shows the first changes made at this section since the production of the D-5a. The influence of a lower incidence angle in the horizontal planes has already been mentioned. However, it is also to be noted in this description that the tail planes of this machine were shorter in chord length than in preceding types; moreover, they were placed farther back of the vertical fin than previous.

The one piece elevator was still retained with a pair of small closely set control horns to which the slightly exposed control cables were connected. The horizontal planes in this instance were built up of tubular steel and wood formers covered with fabric. The plywood-covered vertical fin integrally formed with the cone of the body, curved high into the rudder which was similar to the rudders used on the D-1, D-2 and D-3 models.

The landing gear was the same as that used in the D-5a and Dr-1. The armament consisted of the usual pair of Spandau, but on this machine, the guns were mounted closer to 12" apart between the engine banks and nearer to the turn of

the propeller. As may be noted, a wind-shield was again the granted requisite for the pilot.

The speed of the Albatros D-7 is calculated by various reliable reports to have rated from 135 to 140 miles per hour at 6500 feet with its 105 h.p. Benz 3Vb (V8) engine, and the rate of climb approximately 6500 feet in 7 minutes. Little seems to be known however, in reference to the actual front line service of this machine. Leader of the experimental designs that followed in rapid succession, it was produced in small numbers but placed conveniently in most strategic points along the front. At this time, the Pfalz and Roland single-seaters began to compete strongly.

As a result, the production of a "traditional" Albatros defender brought about a successor to the D-7. As this was the greatest experimental period to have existed in the system of the Albatros-Werke, the L-39, better known as the Albatros type D-9, steals all successor's honors from the L-38 (D-8), which like the D-4, was just another of those wartime productions that hardly got past the designer's drawing board or after exhaustive tests, could not meet with the satisfactory approval of the severe Imperial Air Service requirements.

It is notable, however, that the L-38 was intently designed as a revolutionary type of fighter in the line of Albatros single-seaters and that this new method of design was so radical and "unsettled" in the minds of the manufacturers, that it served more or less as a model that developed into the "perfected" D-9.

The Albatros D-9 produced under the serial or firm name L-39 came out in October 1917. This new and unique form in the Albatros "D" series marked the first real move toward the big "putsch" in the productive activities of the Albatros-Werke. The intent to sweep the sky of the "verdampft" Spads and Nieuports had become a popularized tradition, but there and at this time, it seemed to be the foremost intention in the German plan. The Spads and Nieuports supported by other competitive Allied fighters, had become yet more forceful. On the German side, competition was also closing in but the Albatros was not to rest on its past great record.

By intensive experiments with different types of motors and structural designs, the Albatros D-9 developed to herald a "new series" in temperance with the stage of advancement found in most fighting machines of that time. In taking up the brief description of the Albatros D-9, the unique fuselage which presented such changes over the forms employed in preceding types, was designed in view of the lightplane models that followed.

This new form consisted of five main longerons of wood to which were attached ten unusually shaped body sections. Two longerons on each side were employed to substantiate the flat sides and bottom, while the fifth member was centered on the curved upper halves of the body sections ahead and behind the cockpit, flowing to the tail in the manner of a spinal cord. Four unusually shaped body sections

attached at regular intervals ahead of the cockpit to the tip of the nose, served to form this section of the body which in this instance was also changed in comparison to preceding forms.

Here it should be noted, the desirable "bullet-nose" effect found in all preceding D models, was not eliminated in the absence of the customary large spinner. By eliminating the previously employed spinner, the exposed sections near the streamlined hub, served to increase the efficiency of the propeller, at the same time making a slight but precious saving on nose-heaviness. To retain the almost perfect "bullet-nose" effect, the nose was built up of a small half-shell of light metal which curved to form the lower part of

the tip. This was fastened to two larger metal platings which in turn attached to the nose on each side of the engine, protecting the plywood panels into which were set the metal air-vents and inspection covers.

With the exception of the nose disc which retained a somewhat oval cross section, the three body sections ahead of the cockpit presented a form similar to the "hood" of the British S.E.5.

This section was rectangular at the bottom and curved at the top, a familiar effect employed extensively in cabin monoplanes of later times. The effect was carried on by the remaining sections from the rear of the cockpit, diminishing at intervals to a horizontal knife edge at the tail.

With exceptions of the metal plating at the nose, the fuselage was covered as usual with three-ply wood veneer. To facilitate the mounting of this machine, a customary type of self-closing step plate was provided on the lower body longitudinal near the cockpit, and as an additional convenience, a fixed steel tube bar protruded on each side of the body just ahead of the horizontal plane to enable the lifting of the tail when moving the machine about prior or after use.

As a whole, the body of the D-9 was the lightest developed in all previous designs since the experimental 1915 Albatros scout. The wing structure of the D-9

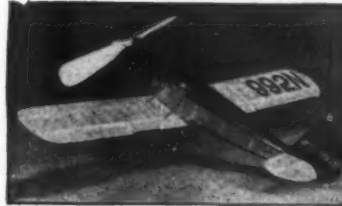
(Continued on page 46)

TROPICAL KITS ARE KITS!

A ONE INCH to the foot FLYING scale model of the Curtiss Sparrow Hawk with 25 1/2" span, 19 1/4" length, 1.5 oz. weight. A minutely detailed, exact reproduction of the fighters carried in the U.S.S. Macon. Kit contains: Turned drag ring, wheels and cylinders. Ready hand carved propeller! NINE ounces of dopes and cement, tissue, free wheeling propeller attachment, helical pitch block design, scale prop block, 4 sheets printed balsa, insignia, printed fuselage and tail markings, formed wire fittings, washers, aluminum tubing, balsa strips, waxpaper, sand paper and TROPICAL'S IMPROVED FEATURES. The true color scheme of Navy gray, aluminum, yellow and black. A model kit that cannot be BEATEN!!!



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Spartan C-2-60..... P. P. \$1.25

This kit is a 1/4" to one foot flying scale model 25" span, 14 1/2" length, 1.5 oz. in weight, designed from the true airplane. A regular flying foot! Kit contains full sized plans with instructions and material list, dopes, cement, colored tissue, turned airwheels, prop blocks, formed wire fittings, washers, balsa strips, aluminum tubing, wax paper and sandpaper.



Kit FX-9 50c
Using P12-E, P.P.

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Kit FX-8 35c
Stearman 81, P.P.

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Instructions for Ordering

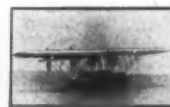
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Kit SS-3
Sikorsky 8-41

These 9" solid model kits are unique in that they contain printed wood of the correct thickness for wings and tail surfaces, also plans, large full-sized plans and instructions, turned wheels, generous quantities of cement and colored dopes, sandpaper and cellophane—plenty of material to build the model.

SS-1 Springfield Reaser SS-4 Wedell Williams
SS-2 Vought Corsair V-80 SS-5 Lockheed Orion
SS-3 Sikorsky 8-41 SS Curtiss Sparrow Hawk

P.P. 35c



Kit SS-5
Lockheed Orion

TROPICAL SUPPLIES

Balsa Sheet 18" Lengths	1/16x3/16 3 for .01	3/16x1/16 3 for .01
1/64x2 ..... .03	3/32x3/32 2 for .01	1/4x1/4x12 ..... .10
1/32x2 ..... .03	1/2x1/2 2 for .01	1x1 1/2x12 ..... .06
1/32x3 ..... .03	1/2x1/2 1 for .01	1x1 1/2x13 ..... .06
1/16x2 ..... .03	1/2x1/2 1 for .01	7/8x1 1/2x14 ..... .09
1/16x3 ..... .05	1/2x1/2 1 for .01	1x1 1/2x15 ..... .10
3/32x2 ..... .04	1/2x1/2 1 for .02	
3/32x3 ..... .06	1/2x1/2 1 for .02	Microfilm Solution
1/2x2 ..... .04	1/2x1/2 1 for .02	1 Oz. .... .12
3/16x2 ..... .06	1/2x1/2 1 for .04	Rubber Lubricant
3/16x3 ..... .05	5/16x1/16 1 for .03	1 Oz. .... .12
3/16x3 ..... .09	3/8x1/8 1 for .03	Cement
1/2x2 ..... .04	1/2x1/2 1 for .04	1 Oz. .12 2 oz. .20
1/2x2 ..... .10	1/2x1/2 1 for .04	Rubber
1/2x2 ..... .10	1/2x1/2 1 for .04	.045 squares 2 ft. .01
1/2x2 ..... .15	1/2x1/2 1 for .04	1/4 flat 2 ft. .01
Balsa Strips	1/2x1/2 1 for .04	3/16 flat 1 ft. .01
1/32x1/16 20 for .05	3/4x1/4x8 ..... .04	Japanese Tissue
1/32x1/8 3 for .01	3/4x1/4x8 ..... .04	Black blue, green, olive
1/16x1/16 20 for .05	3/4x1/4x10 ..... .06	drab, yellow, red, ..
1/16x1/8 3 for .01	3/4x1/4x10 ..... .07	Orange ..... .03 per sheet
	1x1 1/2x10 ..... .08	White ..... .03 per sheet

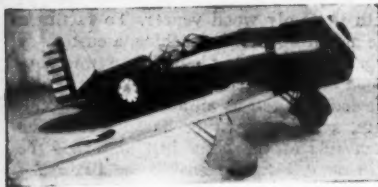
Superfine .. .08 per sheet	Celluloid Wheels	1 1/4" dia. per pair .09
Cowlings	3/4" dia. per pair .06	1 1/2" dia. per pair .10
Lathes turned and base coated.	1" dia. per pair .08	2 1/2" dia. per pair .13
1/2 dia. 2 1/2 dia. 3 dia.	1 1/4" dia. per pair .11	1 1/2" x 1/2" Air Wheels
Open .... .20 .25 .30 .35	1 1/2" dia. per pair .17	per pair .10
Closed .... .20 .25 .30 .35		Muscle Wire
Drag .... .20 .25 .30 .35		Gauges 6-8-10-12-14
Hardwood Wheels		.01 per ft.
1/2" dia. per pair .03		Eyelids
3/4" dia. per pair .05		Small brass, per doz. .05
1" dia. per pair .07		Die Cast Propellers
Dope		Two Bladed
Clear, red, yellow blue, green, black, white, olive, drab, silver, orange.		1 1/2" ..... .10
1 oz. .12 2 oz. .20		2 1/2" ..... .15
Banana Oil		1 1/2" ..... .10
Clear and refined 1 oz. .12		2 1/2" ..... .15
Aluminum Drag Rings		Lewis Type Machine Guns
3/4" ..... .08		1/2" ..... .08
1" ..... .10		1 1/2" ..... .10

Celluloid Wheels		1 1/2" dia. per pair .08
3/4" dia. per pair .06		1" dia. per pair .08
1" dia. per pair .08		2 1/2" dia. per pair .13
1 1/2" dia. per pair .11		1 1/2" Air Wheels
1 1/2" dia. per pair .17		..... per pair .10
Washers		Muscle
1/4 O. D. brass per doz. .06		Wire
3/16 O. D. copper	per doz. .05	Gauge 6-8-10-12-14
		..... .01 per ft.
Celluloid Motors		Eyelets
1 1/2" dia. .... .20		Small brass
2" dia. .... .27		per doz. .05
3" dia. .... .35		The Cant
Brushes 2 for .05		Propellers
		Two Bladed
Wing and Tail		1 1/2" ..... .10
Lights		2 1/2" ..... .15
1 set (3) for 12" ..... .10		1 1/2" ..... .10
1 set (3) for 15" ..... .15		2 1/2" ..... .15
		Lewis Type
Bamboo		Machine Guns
1/32" sq. x 11" .3 for .01		3/4" ..... .08
1/16" sq. x 12" .3 for .01		1 1/2" ..... .10
1/16x1/4x15" .1 for .01		1 1/2" ..... .15
Balsa Wheels		Bombs
1/2" dia. per pair .04		3"05
3/4" dia. per pair .06		1 1/2"10
1" dia. per pair .08		Sheet Celluloid
		2"x6" sheet05

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A beautiful scale model as illustrated, all formers, wing ribs, etc., cut to exact size and notched for stringers, spars, rubber tired wheels, carved prop 15", yellow and drab dope, glue, etc. This model is specially engineered, and is very strong so as to fly with gas motor. Const. Set, Postpaid, excluding motor **\$25.00**

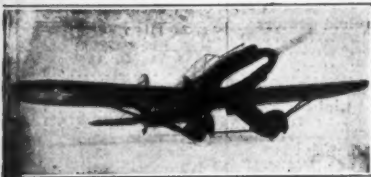
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¾" bore 1" stroke, 4000 R.P.M. Price, ready to run, postpaid..... **\$22.50**

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22½" Span, Weight 2½ oz., Flies 750 Feet

Set contains 3" celluloid motor, aluminum drag ring and m. plate, ribs and formers printed on balsa, celluloid wheels, silver discs, wing rudder, Navy and fuselage insignia, semi-finished prop., yellow and silver dope, glue, drawing and all materials. **\$2.95**
Const. Set, P. P.

New Curtiss XP934 Pursuit

24" Span, Weight 1 oz., Flies 675 Feet

Set includes semi-finished wheelcaps, glistening hollow metal exhaust pipes, strong aluminum wheels, two color dopes, glue, wing and rudder insignia, U. S. Army lettering, detail drawing, ribs, formers, etc., printed on balsa. Const. Set, Postpaid.... **\$1.75**

Illustrated Catalogue 3c Stamp

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Slipstreams

(Continued from page 23)

focal length for your lens. A simple way to find this is as follows: cut a slot one-half the diameter of the lens and the same thickness as the lens in a sheet of 1/16 inch balsa wood. Insert this lens into the slot so that most of the lens sticks out from the sheet. Then put a ruler against the bottom of the lens, holding the ruler along the sheet of balsa. Get into a semi-dark room and with a thin piece of paper held at the three inch mark on the ruler, point the apparatus at a window. If the image is reflected sharply, three inches is your focal length. If it is indistinct or blurred, move the paper back and forth along the ruler until it is clear and sharp. Build your camera as long as the focal length is on the ruler.

Construction

Camera Box—Cut four pieces of 1/16 balsa the proper size. Then make the back. Pin the four sides as shown in the drawing and insert the back so as to be sure to get the camera square. Glue the sides. Make the front piece and cut the hole. Glue the lens on the back and the whole thing to the front end of the camera. Use a triangle frequently. Every piece must be square. Be sure the back fits snugly. The four 1/16th inch square pieces of balsa (f) in fig. 1 and 2, Diagram Number 3, must fit snugly against the back to insure against light leaks. Put on shutter grooves (d), fig. 3. Make the stop bar (a) in fig. 3 and cement in place.

Shutter—Cut piece the indicated size, shape and make the shutter hole. Be sure to center the hole exactly. Bend hook (a) in fig. 4 and put in place. The bent over part must fit flush against the underside of the shutter or it will prevent the latter from working smoothly.

Shutter Release—Make shutter release (h) in fig. 3 and put in place (h) in fig. 1. Cement pin on inside of camera only. The release guide is put on as shown in fig. 1, (e).

Assembly—Before assembly, paint all parts flat black. Paint camera INSIDE AND OUT! Do not use glossy paint. The reflection will ruin your pictures if you do. Insert the slide from the bottom with the hook down. Then take a three inch loop of rubber and put it around the hook, over the top of the camera and loop it over the back. This serves as a shutter spring and holds the back tightly in place. Be sure the slide works smoothly before attempting any exposures.

Taking the Pictures—Use any film. Kodak or cut is all right since you will have to cut it the correct size anyway (¾ x 1¼"). Use an absolutely light-proof room for loading the camera. Unless panchromatic films are used, you may load by the light of a dim red light. After the camera is loaded, push the shutter down and put the shutter release over into lock position (a) on fig. 1. Mount the camera on a model, kite or balloon after tying a thread to the shutter release. On a flying model airplane, there are several simple ways of pulling the thread by way of the rubber motor tension or by winding the thread on the propeller shaft. However, on a balloon or kite, it is best to tie a

long thread to the shutter release and when the kite or balloon gets the desired height, pull the thread. This method may also be used on the model airplane if desired. For bright or dull days, different exposure times may be gotten from using longer or shorter, weaker or stronger rubber bands. Follow directions with care and with a little experimenting you are bound to get some pictures you will be proud to show your friends. They may be enlarged up to 5" x 7" at any photograph studio.

Fundamentals of Model Airplane Building

(Continued from page 11)

under "Cans" in the plans. This is full-size. Cans are used to keep the rubber in place against the sticks and Mr. Grant has designed this combination brace and can to cut down operations and weight.

The last brace is located at the trailing ends of the sticks. It is bent from a 10¼" long piece of 3/64" diameter wire. Both of its ends are bent for a distance of ¾", which leaves 9½" of its length straight. This is shown in the magnifying-glass view in the plans under "Top View."

When all these wires have been bent to shape, they are assembled on the A-frame. The trailing brace should be attached first. As a thread binding is used around its bent ends and the propeller bearings of the model, the latter should be attached at the same time.

Obtain two propeller bearings of good size. These are cemented to the outer sides of the sticks, while the bent ends of the brace are cemented to the inner sides. When all are in place, bind the bearings and the ends together with thread and apply a thin coat of the cement over the thread for added strength. Note this assembly in the magnified view of the plan under "Top View."

The two cross braces are now cemented in place. Note that their bent trailing ends are lashed to the inner side of the sticks 14½" from the trailing end of the A-frame. Cement and lash the four bent ends of these two braces in place. The brace having the cans on its ends, is located 18" from the trailing end of the assembly and crosses the two cross braces at the point where they cross each other. Mark a point 18" from the trailing end on each stick, pass the bent notch on each end of the brace over the sticks, cement and then bind with thread. Cement is applied over all thread bindings for added strength. Complete the brace assembly by binding all three of these center braces together at the point where they pass each other in the center of the frame.

A nose hook, which is shown in the plans full-size under "Nose Hook," is bent from No. 13 piano wire. This holds the "S" hooks of the motor and at the same time strengthens the nose joint formed by the two sticks. After bending to proper shape, slip it over the joint of the two sticks and cement firmly in place. It is then bound with thread, which is given a thin coat of cement over its top to add strength.

Up to this point we have not spoken of the top or bottom of the stick. As the

curved bends in the cans are to hold the rubber strands of the motor, the opened side of these cans must be the upper side of the frame. The frame is completed by cementing two small blocks on the side of each stick.

These blocks are shown in the plans under "Top View" in the upper left-hand corner. Cut two blocks measuring $\frac{1}{8}$ " thick, $\frac{1}{4}$ " wide and $2\frac{1}{2}$ " long. Cut two additional blocks $1\frac{1}{16}$ " thick, $\frac{1}{4}$ " wide and 1" long. The long blocks are cemented on top of the sticks $4\frac{1}{2}$ " from their leading, or "nose" end. The smaller blocks are then cemented on top of these long ones with the leading ends of both flush with each other. This completes the A-frame.

Elevator

The elevator consists of a single sheet of $1\frac{1}{16}$ " balsa with four ribs of the same thickness. Square up a sheet of the balsa to measure $1\frac{1}{16}$ " thick, $3\frac{1}{2}$ " wide and 14" long. From each end, measure in $3\frac{1}{2}$ " and lay out the curves of the tips. Cut these to proper shape. Finish smooth with sandpaper.

The elevator is now cut through its center into two halves of equal length. Cut four ribs from $1\frac{1}{16}$ " sheet balsa, as shown full-size in the plans under "Elevator Rib." Note their location in the plan under "Elevator." Apply cement to the ribs, bend the elevator carefully to fit their curves and attach them in place. Hold with model pins until the cement has hardened.

The two completed halves are now cemented together with a $1\frac{3}{4}$ " dihedral at each tip. When perfectly dry, complete the elevator by carefully sandpapering its entire surface. As rubber bands are used to hold it in place on the A-frame, no metal fittings are required.

Wing

The wing is of the same construction as the elevator. It differs very little from other all-balsa wings given for other models in this course. It is made of two pieces of $1\frac{1}{16}$ " sheet balsa. Square up two pieces to measure $1\frac{1}{16}$ " thick, $4\frac{1}{2}$ " wide and $16\frac{1}{2}$ " long. Measure $4\frac{3}{4}$ " from one end of each piece and lay out the curve of the wing tip, as shown in the plans. Cut these to shape.

Cut to proper form eight wing ribs from $1\frac{1}{16}$ " sheet balsa. The rib is shown in the plan full-size under "Wing Rib." Note the location of these ribs in the plan under "Wing." Apply cement to the ribs' curves, carefully bend the sheeting around each, and hold with model pins until dry and hard.

The two halves are now cemented together to give a $1\frac{3}{4}$ " dihedral at each wing tip. When hard, reinforce the joint by cementing leading and trailing edge pieces to the underside of the wing. These measure $1\frac{1}{32}$ " thick, $\frac{3}{8}$ " wide and $\frac{7}{8}$ " long, or the distance between the two center ribs. Bend them slightly at their centers and cement them in place between the ribs on the underside of the wing at its leading and trailing edges.

Finish the wing by carefully sandpapering its entire surface to a satin finish. As the wing also, is held by rubber

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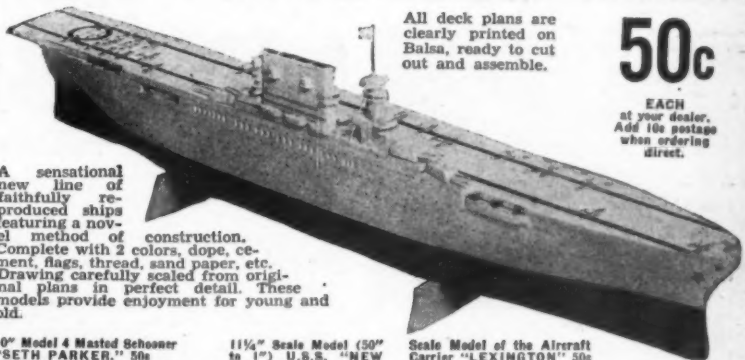
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bands to the A-frame, no metal fittings are required in its construction.

Propellers

In the November issue, our first pusher model called for a left-hand propeller, the use, carving and difference of which was fully explained. When two propellers are used on a model, they must be so made as to turn in opposite directions, so that the directional pull of the one will offset that of the other. For this reason, twin propeller units are always made up of one right and one left propeller. On twin-propeller pushers such as the one we are building, the propellers are so mounted that each will turn up and out, as shown in Fig. 1. In this view the eye rests on the concave side of the propeller's blades.

All the models having propellers in this course have had right-hand propellers with the exception of last month's model, which was a left-hand propeller. It will not be necessary, therefore, to repeat carving instructions for the propellers required for this model. From blocks measuring 1" thick, 1 3/4" wide and 10" long, carve one right-hand and one left-hand propeller. Equip them with propeller shafts bent from 1/32" piano wire, (No. 13). These shafts are shown in the plan full-size under "Propeller Shaft." Com-

plete the assembly by adding two shaft washers to the propeller shafts and then place them in position on their bearings.

Motor

Twin motors for the twin propellers are used on such models as this. Each of these consist of eight strands of 1/8" x 1/30" rubber. As considerable "play" should be allowed for added power, the original length of each motor should be at least 288" long or 24 feet. Tie the ends of each piece together to form a single loop.

From No. 13 piano wire, bend two "S" hooks to shape, as shown in the full-size pattern, in the plans under "S" Hook. Hook one end of each over the nose hook and then pass four loops of the rubber motor over the other ends. Weave the rubber strands through the cans and loop their other ends over the propeller shaft hooks, which completes the motor assembly.

Assembly

With the assembly of the motors completed, we have only to add the wing and elevator to our A-frame to complete the job. Both these units are held with rubber bands. Two bands are used for each. Note how this is done in Fig. 2. Locate the trailing edge of the wing 6" from the trailing ends of the sticks and fasten in place on top of the frame with the bands.

The elevator has its leading edge resting on the lower of the two frame blocks, 4 1/2" back from the nose. Attach in this position with two bands as shown.

When flying the model, launch it in the manner shown in the photograph. It will be found best to hold the propellers with one hand and steady the model with the other rather than using the old method of "pushing" the model from you with both hands on the propellers.

If more elevation is required, the elevator may be thrust forward until its leading edge is on top of the second and higher elevation blocks.

Building the Douglas 043-A

(Continued from page 16)

wood piece which goes in the hole, and D, a fibre washer glued to C. D is set flush with the nose by cutting a shoulder around the hole. D is also beveled around the front surface so that it is flush with the fuselage all around its edge. A hole must of course be drilled through C for the propeller shaft.

The two 1/8" aluminum tubes are set in the nose and are beveled with a file so as to blend smoothly into the nose contour.

The tail wheel is a fibre washer with a piece of 1/16" O. D. aluminum tubing glued in for a bearing. Another piece of this tubing, F, is set in a hole through block G. The wire axle through the wheel is bent back and up on both sides, both ends passing through F and being bound to the top of G and glued in place. The whole assembly is then glued in a slot cut for it in the proper position in the tail.

The main strength of the landing gear comes from the spruce pieces, H. These are glued to the rear of bulkhead No. 1. They have small triangular blocks, I, which act as additional braces. These are shown clearly in the drawings. The blocks are of 1/8" thick balsa and are set in place with plenty of glue.

The streamlining of the struts is accomplished with four balsa pieces, one 1/8" thick piece on front and back and one 3/32" piece on top and bottom. The pieces are fitted well to the fuselage and glued in place. When dry they are cut to the proper streamline shape with knife, razor blade and sandpaper. They are finished off just as the fuselage was, with banana oil and paper.

The axles and shock absorbers are combined in one piece of wire. The single loop of wire gives plenty of spring action to prevent damage in landing. Bind the wire with thread and glue to the end of the struts. No "pants" are used as the wheels

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are of the streamline type. Notice that they are considerably wider at the hub than at the tread. They are of the air-wheel type, but the joint between hub and tire is very smooth. These wheels are best made at home, for so far as the writer knows, none of the proper shape are sold yet by model supply houses. The wheels are of balsa with an aluminum tube through the center for a hub.

The tail assembly is all of bamboo with the exception of the fin leading edge, J, which must be wide at the bottom to blend into the streamlining of the fuselage, and so is made of wood. The fin rear spar, K, is set in place first, followed by J. The rudder outline piece is next bent to shape and fastened on. A small triangular block is glued in at the junction of the rudder outline and K and the fuselage, for strength.

The rudder ribs can now be put in place. Do not put the fin ribs in until the stabilizer has been set in place. The latter is built up on a board and completely assembled before installation. It is entirely of bamboo, except strip L which is used for a center rib and also to fasten the covering to. The ribs are of bamboo, 1/32" x 1/64", and one goes on top and another on bottom at each rib position. Triangular blocks of balsa are used as indicated to give strength at an otherwise weak point.

The stabilizer and elevator assembly rests directly on the fin stub which was carved integral with the fuselage at the tail. The stabilizer has a slight negative angle so the rear spar should be about 1/32" higher than the leading edge, when the model is in flying position. The flying position is that of the side view on sheet No. 1 and No. 2. There is a strut on each side of the stabilizer to the fuselage, designated M, but they are left off until after the covering is applied.

The remaining fin ribs are now put in place and with those the tail assembly is complete.

The wing is in three sections, a center section and two panels. All three are assembled on a board and then installed. The leading edge of the center section is cut at an angle and glued to give the proper shape. It can be sanded to shape after assembly. There are three main ribs and two nose ribs in the center section. The end ribs should be 1/16" fairly hard balsa. The others may be 1/32".

When installing the center section, a piece about 1" or 1 1/4" square may be cut out of the top of the fuselage with a sharp razor blade point. Make the cuts at an angle, not vertically, so that when the piece is replaced it will not slip downward into the fuselage. This piece may well be cut out as soon as the fuselage is finished as it will be much easier to install the landing gear by working through the hole.

The center section balsa struts are first glued in place. When the glue is well set, the finished center section may be set in place and fastened. The wire pins for the wings are, of course, glued in place before installing.

The cabane is built up of four 1/16"

x 1/32" streamlined bamboo pieces and is held in place with glue.

The wings are of orthodox construction and are all of balsa, except for the bamboo tip outlines. Aluminum tubes are bound to the spars in the proper positions to receive the center section wing pins. Tubes of 1/16" O. D. aluminum are glued to the ribs where the support wires are to fasten. These tubes are made the same length as the thickness of the wing. The support wires, which are thread, pass through the tubes and so are in one continuous piece. This allows easy adjustment of dihedral without having to remove the threads.

The wing tips are in line horizontally with the top surface of the wing, not the bottom, so they must be raised above the board on which the wing is made, when in construction.

As may be seen from the drawings, the wings taper both in plan form and in thickness, so care should be exercised to get this taper correct, if an accurate scale model is to be had.

The covering of the wings and tail is done as usual, using Japanese tissue, with banana oil as an adhesive. When the wings are being covered, care must be exercised to do the job without wrinkles and to this end, do not try to cover a wing side with a single sheet of tissue. Near the tips, use a separate piece between each two ribs. (Continued on next page)

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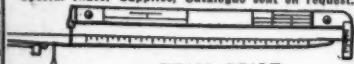
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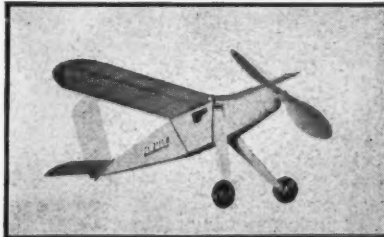
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After covering, spray all surfaces with clean water and allow to dry. Coat with banana oil and again set aside to dry. It is safest to brace the wings when the covering is drying, as the pull of the tightening paper is apt to warp them otherwise.

Before covering the wings, they should be fitted to the center section to make sure the pins fit properly and that the two edges match the center section perfectly.

The surfaces are all painted an army yellow, which is a combination of orange and yellow. The fin, of course, is painted the same olive drab as the fuselage and the rudder has the usual red, white and blue stripes.

All struts are painted olive drab. This includes landing gear, center section and cabane. The wheels are aluminum with a black rim. The propeller and exhaust manifolds are bright aluminum. If they are given several heavy coats of banana oil, with sanding between, the finish will be very smooth and realistic. The usual squadron insignia, numbers and lettering of U. S. Army help to finish off the model.

The cockpit covering, which, incidentally, should be put on before the center section is installed, is in two pieces, the main curved section and the front piece. When it has been glued in place, 1/16" strips of black tissue are laid on with banana oil to represent bracing and joints.

The propeller is three-bladed for realism, although a regulation two-bladed type is lots less trouble. It is six inches in diameter. The best way to make it is to take two finished propeller blanks and cut them in half at the center, using only three of the blades. Lay out on a board and glue them together. When dry, carve out carefully, then add the bracing wires shown and glue thoroughly.

The rubber is regular 1/8" flat type and four to six strands are needed according to the weight of the finished ship.

The model built by the writer from these plans is very highly finished, being made more for an exhibition model, than for knockabout flying. It weighs around 1 1/2 ounces. If you wish to make an out and out flying model, it can be just as well done by making a thinner fuselage

and using colored paper for the wings instead of painting or doping them. This would bring the weight below one ounce which would give exceptional flying ability, although the present heavy model is a very smooth and able flyer.

List of Materials

BALSA

- 2 lengths 14" x 2 1/2" x 1"
- 1 length 12" x 2" x 1/8"
- 1 length 36" x 2" x 1/16"
- 1 length 12" x 2" x 1/32"
- 2 lengths 6" x 1" x 3/8" (for propeller)
- 1 length 36" x 3/8" x 1/4"
- 1 length 36" x 1/4" x 1/8"
- * * *
- 1 length spruce 24" x 1/4" x 1/8"
- Bamboo 12" x 1/4" x 1/8"
- Thin celluloid 6" x 3"
- 2 streamline wheels 1 1/8" diameter
- 1 wheel 3/8" diameter
- 10 feet 1/8" flat rubber
- 2 sheets Japanese tissue
- Aluminum tubing
- Wire, thread, glue, etc.

Aviation Advisory Board

(Continued from page 29)

Question: In covering the upper part of the wing of a stick model endurance plane, is it best to use 1/64" balsa or wood veneer?

Answer: This question is a little ambiguous. 1/64" balsa is wood veneer. Perhaps Stabler means should 1/64" balsa be used for covering instead of paper. If this type of construction is properly worked out, the balsa veneer covering is superior to paper, inasmuch as it provides a smoother surface than paper. There is no sag between the ribs, which destroys the effectiveness of an airfoil covered with paper. If care is not used, the balsa-covered wing will be heavier than the paper covering and will thus destroy its effectiveness. However, a balsa-covered wing may be made as light as a paper wing if the covering is used to absorb the stress instead of using spars.

Question: What sort of motor is best for endurance; a gasoline or compressed air motor?

Answer: A gasoline motor has far greater capacity for endurance, for it will run as long as gas is supplied to it. The amount of gas that can be carried by an ordinary gasoline model is sufficient to run the motor for at least ten minutes. In one case the motor has run as long as seventy minutes. The compressed air motor will run from thirty seconds to two minutes.

Question: Is it advisable to cover a speed model with aluminum leaf?

Answer: We would say "certainly not!" If such a model were covered with this material, we are afraid that the result would be the same as in the case of the Hawaiian dancer clad in a grass skirt, in a gale of wind.

Ralph Olson of Beacon, Michigan, wants an explanation of how ailerons, rudder and elevator controls operate.

Answer: We feel that Olson can obtain

a very much clearer idea of the operation of these controls if he will go to the library and read several hand books on aviation, which are undoubtedly there. It would take too much space here to treat the subject properly and intelligently.

Question: What effect do the ailerons have on an airplane?

Answer: If we answer this question exactly as it is asked, we would say that their primary effect is to add weight to the airplane. However, the effect of the operation of the ailerons on an airplane is to create rotation about the longitudinal axis while it is in flight; either to throw the airplane into a bank from the normal flight position or to rotate it so that it recovers its equilibrium when thrown on its side from normal flight position.

Question: Would these controls operate the same on a dirigible?

Answer: Ailerons are not used on a dirigible. The controls in this case are the rudder and elevators.

Question: Would one propeller be sufficient to drive the airship ahead?

Answer: The ability of the airship to move forward does not depend upon the use of one, two, three or four propellers, but rather upon the amount of power applied through one or more propellers. A model airship could be built which would fly with one propeller.

Question: What was considered the best age for a World War pilot?

Answer: Between eighteen and twenty-one years of age.

Here Come the British

(Continued from page 36)

service, in building flying boats, place the accent on the "flying" and build for good air qualities. In England, they accent the "boat" and as long as they can turn out a craft that is seaworthy in all kinds of weather, they don't seem to care very much whether she flies or not.

Take a look at the latest type, for instance, the Blackburn Perth, a monster of a ship, with three 825 h.p. motors and accommodations for a crew of no less than eight. It's a coastal, anti-submarine job, resembling the H-16s in general structure and the Handley-Page bombers in having a tail gun. She makes 136 m.p.h. in the air, but is quite fit to ride out any storm that ever blew on the surface of the water and is fitted out like a regular naval vessel. She can cruise for 1500 miles without getting out of breath, or from England to Gibraltar and back. There are watertight bulkheads, navigation and towing tackle, sea-anchors, life-belts, rowboats, cookstove and all the rest of it, and even the surprising detail of a 1½ pound cannon mounted on the bow, on a universal joint. And a 1½ pounder, boys, will puncture the skin of a submarine.

The Short R6/26 is another kitten from the same litter, with three 930 h.p. motors, a wingspan of 120 feet, and a total weight of no less than 35 tons. The main difference between this craft and the Black-

burn is that she carries no cannon, but is built especially roomy and equipped for tropical service in the Indian Ocean and Gulf of Aden where submarines are scarce and the cannon unnecessary. There is also a Supermarine type somewhat similar, the Southampton, and a few, a very few amphibians, also built by Supermarine. Britain considers the amphibian as a new experiment. These Supermarine amphibians are single-motor jobs with the four-bladed prop high up behind the upper wing, two-seaters. Very comfortable and seaworthy ships, but not especially fast, they are intended for use as ship-board scouts.

All told, however, you can say that the R. A. F. is in pretty fair shape. It's the most conservative service in the world as far as design goes, but the British have proved on many occasions that they are master flyers, and it doesn't matter so much what the machine is like if you have the right man at the controls. And because of their very conservatism, the British develop good aviators. The bi-plane types they use are easy for the student flyer; most of the training is done on service machines, and the ordinary run-of-mine flyer in the British service is probably a bit better than anywhere else.

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3/16 x 3/16.....6 for 10c	
3/16 x 5/16.....6 for 12c	
1/4 x 1/4.....6 for 12c	
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11".....2 for 11c	
12".....2 for 13c	
14".....2 for 15c	
16".....2 for 17c	
18".....2 for 20c	
PROPELLERS	
Hand Carved	
5" diam. 8c 7" diam. 12c	
8" diam. 10c	
10" diam. 20c	
2-BLADED METAL PROPS	
1½" diam.....10c	
2½" diam.....12c	
3½" diam.....14c	
4½" diam.....16c	
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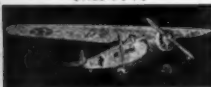
MOTOR PLATES	
for	
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3/16 O. D. per ft.....11c	
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.003 sq. ft.....10c	
.006 sq. ft.....12c	
.008 sq. ft.....14c	
.010 sq. ft.....16c	
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1½" diam.....12c Pr.	
1½" diam.....15c Pr.	
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3½" diam.....25c Pr.	

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1 oz. bottle.....10c	
4 oz. bottle.....30c	
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Large bottle.....5c	
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The Albatros Fighters on Parade (Continued from page 39)

presented no obvious improvements in comparison to its predecessor.

Strangely enough, the thin, almost flat sections in the wings of this machine possessed a great deal of the old C-2 and C-3 influence. The higher lift wing sections of the D-7 were experimentally set aside in the strive for speed and structural lightness throughout the D-9. The wing construction and dimensions were approximately the same as the D-7. The chord length, however, was somewhat increased according to the lowered airfoil and angle of incidence. Ailerons were fitted on both the upper and lower planes. The same cabane, interplane and aileron connecting struts shown in the D-7 were used in the D-9, with two additional interplane struts placed on each side where the bracing cables center-crossed, in the fashion of the French Spad.

At the tail, an additional feature in this machine was the new position in which the horizontal planes were placed. This was almost snug with the lowest body longitudinal in direct alignment with the curvature between the leading edge and front spars of the lower wings. The vertical fin and rudder were the same as the D-7. The lower vertical fin was not quite as deep, and as will be noted in succeeding models, this section became reduced to a minimum. The landing gear was the same as the Dr-1 and D-7 except for the narrow axle-wing last used on the D types in the undercarriage of the D-7.

Powered by a 160 h.p. Mercedes, the Albatros D-9 hardly proved as good a ship as its predecessor employing a 195 h.p. Benz. Probably the only outstanding characteristics were that it was a much lighter ship, and could get around an enemy plane somewhat easier at low altitudes than the D-7; yet, it did not have the speed and climb of the latter which possessed the structural strength and most desirable characteristics demanded in fighting planes of that time.

The next article of this series presents the results of experiments with the D-7 and D-9 and the first rotary motor Albatros fighter.

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On the Frontiers of Aviation (Continued from page 21)

landing gear are employed on the plane. It is powered by a 2500 h.p. V-16 engine designed by that famous automobile race driver, Harry Miller. The Wittman and Armstrong ships are both powered by Curtiss D-12 engines.

Johnny Worthen flew in the Bendix Race in the new taper-wing Wedell-Williams. The ship has a retractable landing gear and is extremely clean in design.

Another new super racing plane is Lee Gehlbach's large green Gee Bee. The plane was undoubtedly the largest single-engined plane of any type whatsoever at the races! It was a two-place ship and resembled former Gee Bee racing planes, but it is twice their size.

Among the small new racers at the 1934 National Air Races were Roy Minor's recently completed Brown low-wing monoplane, Lee Mile's green low-wing and Art Chester's year old mid-wing ship.

Roy Minor's ship, "Miss Los Angeles," was designed along the lines of former Brown racers. The wing span is 19'3" and the length is 19'10". Wing flaps are incorporated in the design and the bright red ship is powered by a Menasco 300 h.p. Buccaneer engine. This plane was the fastest of the smaller racing jobs and placed second in the Charles E. Thompson Trophy Race.

Gordon Israel's small low-wing racer cracked up a few weeks before the races and it was unable to be repaired in time to compete this year. Mr. Israel was unhurt in the crash, caused by a rut in the runway while he was landing the plane.

The stubby little orange Tilbury-Fundy Flash participated in a few of the events.

Roscoe Turner's Wedell-Williams 57, Johnny Worthen's Wedell-Williams 92 and the late Doug Davis' ill-fated Wedell-Williams 44, were also present. Roscoe Turner is now having a ship built for next year's races.

Major De Seversky performed for the huge crowds that crowded the airport in his Sev-3L. (See U. M. A. N. October issue).

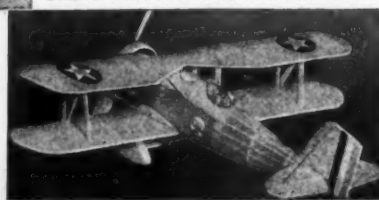
Among the new transport planes were the Stinson tri-motor and the Vultee low-wings. The Stinson exhibited a very fast climb, almost like that of our military ships! An interesting structural feature of the large transport was the walls of the cabin, six inches in thickness. They contained almost enough insulation to make the cabin almost entirely sound-proof.

Howard Hughes' redesigned, Boeing "Sport" made its appearance as well as a Boeing P-12-B privately owned by Milo Burcham, famous up-side-down flier. Howard Hughes, as you probably know, was the producer of "Hell's Angels."

The new Luscombe, Beechcraft, Monocoupe, Stinson and Waco jobs were also well represented. One Waco of interesting design contained an in-line air-cooled engine, developed by the Glenn L. Martin Company. The Texaco company also had their redesigned single-place Waco there.

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1/4x24" 8c 3" 11c 4" 13c

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1/8 x 1/4.....6 for 5c
3/16 x 3/16.....3 for 5c
3/16 x 1/4.....3 for 5c
1/4 x 1/4.....2 for 4c

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1/2 x 7/8 x 6".....4 for 5c
5/8 x 1 x 8".....3 for 7c
3/4 x 1 1/4 x 10".....2 for 9c
7/8 x 1 1/2 x 12".....1 for 9c
1 x 2 x 24".....each 15c
1 x 3 x 24".....each 20c
1 x 2 x 24".....each 25c
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Large or small, each.....2c

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The Army, Navy and Marine Corps put on a fine show for the four days of the meet. The Army had eighteen of the new Boeing P26-As on hand. These ships out-performed all other military ships at the races. Their exceptionally fast speed as they passed the grandstands a few hundred feet from the ground, enthused the thousands of on-lookers. On landing, the brake locked on one of the fleet pursuits and the ship went completely up on its nose without injuring the pilot. The plane was righted again, the motor started once more and the plane taxied to the other side of the field as if nothing had happened! That shows how well-built our military planes are! The P26-A ships have a cruising range of 600 miles. They land at 82 m.p.h., their conservative normal top speed is 227 m.p.h. with full load and they have a 180 m.p.h. cruising speed. Five twenty-five personnel bombs may be carried by them.

Mercury Aircraft, Inc., has built a new non-rigid airship for the Army known as the TC-14. A speed of 80 m.p.h. is expected and it will cruise for 72 hours.

The Northrop Corporation has just recently completed twenty-two Northrop attack planes for the Chinese military forces! These planes of all-metal construction are similar to the Army Northrop Attack plane built for our air forces, which proved to be unsuitable for our particular requirements of a military attack plane.

The defunct Keystone Aircraft Company of Bristol, Pennsylvania, has leased its factory, hangar and airport, to Fleetwings, Inc., formerly of Roosevelt Field, Long Island. Fleetwings will begin the construction of an airplane built entirely of stainless steel, having been well pleased with the successful testing of a special stainless steel Savoia Marchetti in the past two years.

Detroit Aircraft, which at one time owned and operated such famous companies as Ryan, Lockheed, Eastman and others, is now about to produce a new plane after having been idle and in the hands of receivers for the past few years. Mr. Mayo, formerly connected with Mr. Stout and now a director of the much-scattered United Aircraft and Transport Corp., is said to be with the Detroit Aircraft Corporation also.

How to Build a Solid Wood Scale Model of the Consolidated

P-30 Pursuit Plans Page 20

Make the fuselage first. White pine or balsa may be used. Draw the outline of the side view of the fuselage not including the pilot and gunner cabin, on block of wood the thickness of the fuselage. Cut around this outline with a jig-saw or sharp chisel. Go over the top and bottom with coarse sandpaper and then draw on the top elevation. Whittle down the sides with a chisel or knife. Go over these newly-cut surfaces with coarse sandpaper and then begin to round out the fuselage. In doing so, refer to the numerous cross sections. The supercharger will be made later. When the fuselage is completed, go over it once more with coarse sandpaper and then fine sandpaper, giving it a smooth surface.

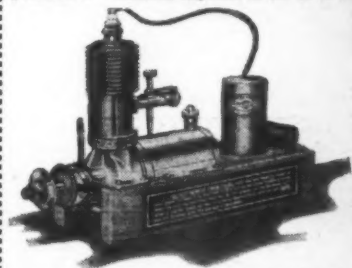
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The wing may be made in one piece and fitted into a slot cut in the bottom of the fuselage or it may be made in two pieces and joined to the sides of the fuselage. One way is just as easy as the other. Draw the top view of wing on board with grain of wood running lengthwise. Cut around the outline with saw and then taper down the wing as shown in front view of model. A sharp chisel is best to be used in this procedure. When that has been accomplished, shape out the airfoil, referring constantly to wing cross sections. If you have difficulty in carving the wing fillets, that is, the fairing where the wing joins fuselage, they may be put on with putty after the assembly of the model. Sandpaper the wing thoroughly and draw on the ailerons.

WRITE for our free offer and bargain list of supplies! Presque Isle Model Aircraft, 926-G West Sixth St., Erie, Pa.

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Make the tail units, consisting of rudder, fin, stabilizer and elevators in a similar manner as you did the wing. A razor blade may be used in this case as the wood is relatively thin. Sandpaper these three pieces and draw lines separating the controls.

The three-bladed prop, which is controllable on the real ship, is made in four parts; the three blades and the hub. The hub is just a small round piece of wood which the three blades, cut from a flat piece of sandpapered wood, may be joined to. Use ambroid in connecting parts. Insert a pin through the hub to act as shaft.

The supercharger may be made from a piece of wood 1/8" in thickness. Other dimensions are given on side elevation of the model. The long slender air vent in

front of the supercharger should be made from a 1/16" piece. The exhaust, directly above the air vent and supercharger, may be made by bending a piece from some thick wire, preferably copper wire. Ambroid each of these three parts to the side of the fuselage. The small air vent directly above the supercharger may be made from scrap wood. Make one also for the other side and connect both to fuselage.

Make the enclosure over the fuselage next. The windshield struts, none of which have to be bent, are to be cut from a strip of 1/16" sq. wood. The other three circular panels may be made from a good grade of thin cardboard so they will be easy to bend into shape. Ambroid the five windshield panels first and then the others. Isinglass may be used as window glass. Ambroid a long strip of 1/16" sq. wood on each side of enclosure as shown, to hold isinglass firmly.

The landing gear is merely composed of the two wheels and the two struts, the wheel connected to the strut by a small piece of wire. The small tail wheel, which can be easily made, is connected to the fuselage with wire as shown.

Sandpaper all parts with fine sandpaper and brush off all dust. Several coats of the fuselage, stabilizer and elevators, should be painted olive drab; the wing and fin a bright yellow. Paint the vertical band on the rudder blue, the horizontal black bands red and the others white. On the wing, paint the star white, the inner circle red and the background blue. Paint the hubs of the wheels yellow, the tires black. The prop should be colored silver.

When the paint has dried, ambroid the wing to the fuselage. Then connect up the tail sections, using small blocks to hold them in place until connections dry. Lay the model on its back and connect the landing gear, using plenty of ambroid.

Join prop to nose and touch up all connections with ambroid and dope. The model will then be completed.

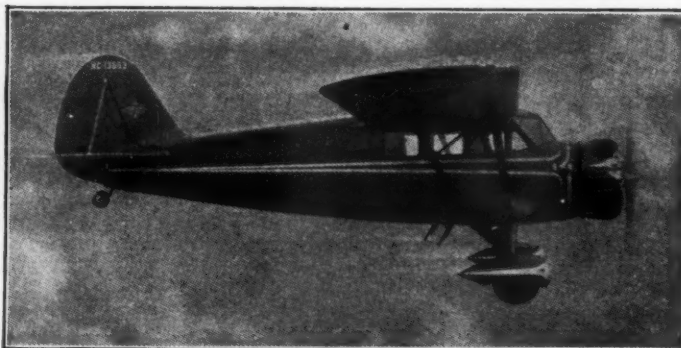
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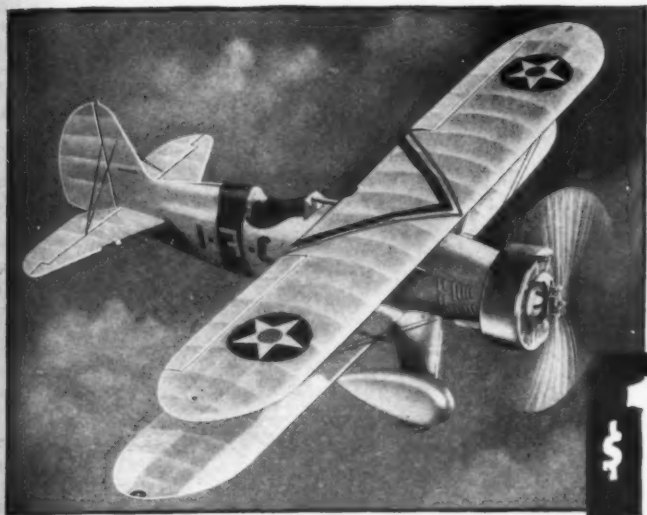
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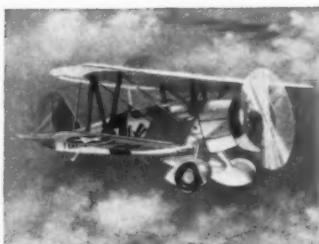
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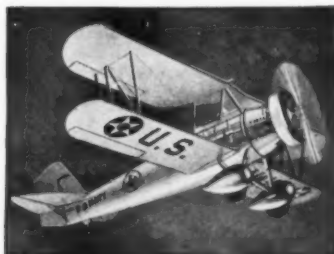
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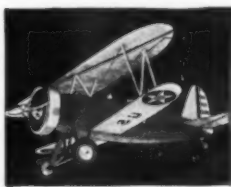


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